**COPENHAGEN BUSINESS SCHOOL**
**HANDELSHØJSKOLEN**
SOLBJERG PLADS 3
DK-2000 FREDERIKSBERG
DANMARK

www.cbs.dk

ISSN 0906-6934
ISBN 87-593-8442-8

ISBN 978-87-593-8442-8

Knowledge Management Systems in Practice – A Work Place Study

PhD Series 29.2010

Copenhagen
Business School
HANDELSHØJSKOLEN

# Knowledge Management Systems in Practice – A Work Place Study

**Kristian Tørning**

Doctoral School of Organisation
and Management Studies

PhD Series 29.2010

CBs PhD nr 29-2010 Kristian Tørning · A4 OMSLAG.indd 1 07/09/10 15.06

# Knowledge Management Systems in Practice – A Work Place Study

Kristian Tørning
*Knowledge Management Systems in Practice – A Work Place Study*

1st edition 2010
PhD Series 29.2010

© The Author

ISBN: 978-87-593-8442-8
ISSN: 0906-6934

The Doctoral School of Organisation and Management Studies (OMS) is an interdisciplinary research environment at Copenhagen Business School for PhD students working on theoretical and empirical themes related to the organisation and management of private, public and voluntary organisations

All rights reserved.
No parts of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage or retrieval system, without permission in writing from the publisher.

# Knowledge Management Systems in Practice

## - A Work Place Study

by

Kristian Tørning

*Department of Organization, Copenhagen Business School,*

*Kilen, Kilevej 14A, 4.,*

*2000 Frederiksberg, Denmark*

*kristian.torning@gmail.com*

> "We brought in psychologists and social scientists to serve as observers and facilitators. They were as important to our team as the hardware and software developers."
> (Engelbart, Lehtman 1988, p. 246)

**Candidate:**
Kristian Tørning
Department of Organization, Copenhagen Business School,
Kilen, Kilevej 14A, 4.,
2000 Frederiksberg, Denmark
kristian.torning@gmail.com

**Supervisor:**
Professor Kjeld Schmidt
Department of Organization, Copenhagen Business School,
Kilen, Kilevej 14A, 4.,
2000 Frederiksberg, Denmark
ks.ioa@cbs.dk

# 1. CONTENTS


**1. CONTENTS** ..... **3**
**2. ENGLISH ABSTRACT** ..... **5**
**3. DANISH ABSTRACT** ..... **6**
**4. ACKNOWLEDGEMENTS** ..... **7**
**5. INTRODUCTION** ..... **9**
5.1 What is an Industrial PhD? ..... 10
5.2 The Paper Based Dissertation Format ..... 10
5.3 Danfoss and Danfoss Business System ..... 11
5.4 The candidate and his motivation ..... 14
**6. RESEARCH AREA AND APPROACH** ..... **15**
6.1 Management Decision Problem at Danfoss ..... 15
6.2 The Wider Collaboration System at Danfoss ..... 16
6.3 Research approach ..... 17
6.4 A few Examples of Persuasive Design ..... 19
*6.4.1 Tangible object: Latour's Hotel Key ..... 19*
*6.4.2 Environment: External speedometer ..... 21*
*6.4.3 Infant Simulator ..... 21*
**7. RESEARCH QUESTIONS** ..... **23**
**8. PREVIOUS WORK** ..... **25**
8.1 KMS – working with 'knowledge' ..... 25
8.2 Persuasive design ..... 28
*8.2.1 'Persuasive' and 'design' ..... 30*
*8.2.2 A New Area of Research? ..... 32*
*8.2.3 Examples of ICT based Persuasive Designs ..... 34*
**9. RESEARCH PROCESS AND METHOD** ..... **39**
9.1 Research Process ..... 39
9.2 The Main Method for Data Generation ..... 42
**10. PAPERS PRODUCED** ..... **45**
10.1 Paper 1 & 2 – RQ1: Explorative work ..... 46
*10.1.1 Purpose ..... 46*
*10.1.2 Method ..... 46*
10.2 Paper 3 – RQ2: Literature review ..... 47
*10.2.1 Purpose ..... 47*
*10.2.2 Method ..... 47*
10.3 Paper 4 – RQ1: In-depth fieldwork ..... 48
*10.3.1 Purpose ..... 48*
*10.3.2 Method ..... 48*
10.4 Paper 5 – RQ3: Prototype testing ..... 50
*10.4.1 Purpose ..... 50*
*10.4.2 Method ..... 50*
**11. SUMMARY OF FINDINGS** ..... **53**
11.1 Preamble ..... 53
11.2 Summary of RQ 1 findings ..... 53

*11.2.1 Papers 1 & 2* ..... *53*
*11.2.2 Paper 4* ..... *70*
11.3 SUMMARY OF RQ 2 FINDINGS ..... 71
11.4 SUMMARY OF RQ 3 FINDINGS ..... 72
**12. CONCLUSION ..... 75**
12.1 DISCUSSION AND FUTURE RESEARCH ..... 77
*12.1.1 'Cooperation' on knowledge sharing?* ..... *77*
*12.1.2 "Stock" KMS in Practice…* ..... *77*
*12.1.3 The Persuasive Design Approach* ..... *78*
12.2 VALIDITY ..... 79
**13. REFERENCES ..... 81**

**APPENDIX 1: Paper 1 ..... 91**
**APPENDIX 2: Paper 2 ..... 103**
**APPENDIX 3: Paper 3 ..... 121**
**APPENDIX 4: Paper 4 ..... 131**
**APPENDIX 5: Paper 5 ..... 165**
**APPENDIX 6: Survey ..... 179**

# 2. ENGLISH ABSTRACT

This dissertation contributes to the existing body of knowledge on how we design computer systems, particularly multiuser software for knowledge sharing and creation in globally diffused companies. This is achieved by conducting a work place study of a global industrial engineering conglomerate which has the strategy of working with knowledge in the form of "best practices" meant to boost performance. The thesis explores the situation that workers are in, since they are meant to share and develop "best practices" knowledge in a portal based Knowledge Management System (KMS). The study indentifies a set of problems that prevents knowledge sharing from taking place to the degree to which management was specifically aiming. It was explored whether these problems could, to some degree, be mitigated by employing persuasive design, which is a new stance towards design where the aim is to directly seek to change the user's behavior, i.e., persuading more knowledge sharing.

The main contribution is an indication of an anomaly with regards to the strategic approach towards knowledge management, where knowledge sharing is seen as an effort by which companies can gain a competitive advantage by working with knowledge in a structured fashion. The issue is that the descriptions found in literature on strategic knowledge management do not address the many issues uncovered when conducting prolonged fieldwork among workers who engage in the activities that the literature seemingly takes for granted. Thus, many practical problems were uncovered that would need some level of mitigation before a company could hope to gain a strategic advantage from working with knowledge. This challenges the "stock" approach towards knowledge management, which seems to address only the management level of the organization.

A contribution is also made in exploring the state-of-the-art of the emerging field of persuasive design. Persuasive design aims at enabling designers to create designs that deliberately change the user's attitude or behavior. According to this new design tradition, the designer specifically designs with the aim of behavior transformation. The goal is a deliberate behavioral change, rather than supporting a set of existing tasks or a set of existing behaviors. The work presented shows how persuasive design is a very conceptual area of research, and that it is not a fitting approach for attaining a higher degree of participation in computer systems for knowledge sharing and creation. Persuasive design is thus not the remedy for the many problems found that prevent knowledge sharing from taking place.

# 3. DANISH ABSTRACT

Denne afhandling bidrager til den eksisterende viden om, hvordan vi designer flerbruger computer- systemer til videndeling og -skabelse i globale virksomheder. Dette er opnået ved at udføre et feltstudie af en global ingeniørvirksomhed, der har som strategi at arbejde med viden i form af ”best practices” for at forøge performance. Afhandlingen undersøger den situation, som arbejderne er i, da det er meningen, at de skal dele og udvikle ”best practices” viden i et portalbaseret Knowledge Management System (KMS). Undersøgelsen identificerer et sæt af problemer, der forhindrer videndeling i at finde sted i den udstrækning, som ledelsen sigter efter. Det blev også undersøgt, om nogle af problemerne kunne afhjælpes ved at anvende persuasivt design, som er en ny tilgang til design, hvor der sigtes direkte efter at ændre brugernes adfærd - dvs. overbevise dem om at dele mere viden.

Hovedbidraget er en indikation af en anomali i den strategiske tilgang til videndeling, hvor man anser videndeling, som et projekt virksomheden kan bruge til at opnå en konkurrencemæssig fordel ved at arbejde struktureret med viden. De beskrivelser, vi finder i litteraturen, om strategisk videndeling adresserer ikke de mange problemer, som blev afdækket af længerevarende feltstudier blandt arbejdere, der skal udføre de aktiviteter, som litteraturen tilsyneladende tager for givet. På den måde blev der fundet mange praktiske problemer, som ville kræve at blive løst, før et firma kan gøre sig forhåbninger om at få en strategisk fordel ud af at arbejde med viden. Dette udfordrer ”hylde”-tilgangen til videndeling, som kun adresserer ledelseslaget i organisationen.

Et andet bidrag er undersøgelsen af state-of-the-art for det nye område persuasive design. Persuasive design sigter efter at gøre det muligt for designere forsætligt at skabe designs, der ændrer brugerens attitude eller adfærd. Inden for denne nye designtradition, designer designere specifikt med adfærdsændring for øje. Målet er en forsætlig adfærdsændring, frem for at støtte eksisterende opgaver eller adfærd. Det viser sig, at persuasivt design stadig er et meget konceptuelt forskningsområde, og at det ikke er en passende tilgang til at opnå en højere grad af deltagelse i computersystemer til videndeling og -udvikling. Persuasivt design er således ikke kuren imod de mange problemer, der forhindrer videndeling i at finde sted.

# 4. ACKNOWLEDGEMENTS

Olivia, my wife, is the primary reason that I was able to complete this project. Her support has been invaluable. She offered me plenty of support when I felt like giving up, and she never criticized me even when I contemplated doing so. She offered me practical help by ensuring that I had lunch and plenty of fresh carrots when leaving for my office. She visited me while I was at Stanford, and she brought tears to my eyes when she left me there. Olivia, you offered me warmth and comfort when I returned from my many trips to Danfoss; most importantly, you never made me feel that I had let you down, when I surely did so.

I extend special thanks to my supervisor, Kjeld Schmidt, for taking on this project and helping me through a difficult time. I had the benefit of a living encyclopedia with an admirable knowledge of computing, work and philosophy. Kjeld, you calmed my nerves in times of crisis, and your pragmatic stance towards producing a PhD was refreshing and gave me extra energy when it was most needed. I also thank you for your ability to lead me to understand when I was wrong, while still letting me find out at my own pace.

I would also like to thank both Marius Hartmann and Morten Bach Jensen for sharing their own PhD experiences with me, and for offering me much kindness and encouragement, and for making headaches seem less serious before they grew out of proportion. I also thank my Danfoss supervisor, Søren Peter Iversen, as well as my nearest manager Mette Luplau Schnefeld, the best manager I had at Danfoss. Thank you both very much for following formal procedures in the midst of organizational chaos; if you had not supported me, things may have turned out very differently.

Lastly, I thank my father and mother who brought me to this world, and also show gratitude to my wider circle of friends who have all shown understanding for this three-year endeavor. Thank you all for accepting my choice to meddle with science.

# 5. INTRODUCTION

Structure: *This chapter introduces the project from a practical perspective. It explains what an industrial PhD is and how it differs from an ordinary PhD. The host company, Danfoss, and the candidate are introduced, and the thesis dissertation format is provided.*

Essence: *Industrial PhD work is subsidized by the Danish Government. Under this funding scheme, research must address practical business problems which are relevant for the company that hosts the PhD. The host company for this project was The Danfoss Group, a global industrial engineering conglomerate. The Candidate has a strong practical background in software development, mainly from the perspective of user experience design. A 'paper based' thesis is a format where a collection of articles is handed in with a report that ties them together by explaining how the research questions are answered.*

The general topic of this PhD concerns the design of computer systems that are to support working with knowledge. In the case presented here, the aim was to investigate how we might create internal systems in a large corporation in such a way that the systems would lead to more user contributions (sharing behavior), as this was important for following the strategy of the case company.

Over a three-year period, field studies were undertaken to shed light on different aspects of the problems of using a Knowledge Management System (KMS) to share and development knowledge at the host company. The general approach taken was that of ethnography by engaging the employees at the company in order to gain insider understanding of their situation, culture and language in regards to sharing, creating and retrieving knowledge. As the research progressed, to a larger degree, it focused on the reasons why employees did not share and develop as much knowledge as management expected.

Further, the research sought to determine how a corporation might address some of the problems of attaining sharing behavior by employing the conceptual approach of 'persuasive design,' to inform the design of a portal based SharePoint® KMS. This was done by producing prototypes and validating them with users.

## 5.1 What is an Industrial PhD?

The PhD project presented here is an *industrial* PhD project hosted by The Danfoss Group, which had had some implications for this work. Industrial PhD research is undertaken at a host company, but it is subsidized by the Ministry of Science, both in regards to salary and in regards to expenses, such as conference participation and extended visits abroad, etc. The idea behind the Industrial PhD program is that subsidizing such projects might bridge the gap often evident between academia and industry. A formal requirement of Industrial PhD projects is that they must have business implications or at least address a clear business problem. To meet the requirements, all industrial PhDs are formally required to take an obligatory PhD Business Course (7.5 ECTS) and write a business report covering the business aspects of the work done. This clearly adds to the complexity of the PhDs. Companies support research for many reasons other than altruism or sheer love of knowledge itself; typically they seek knowledge that can somehow translate into added profits. When they finance research in part, they become stakeholders in projects in a manner that differs from only providing access to the creation of data. This naturally puts pressure on researchers, and it means that things that affect the hosting company's core business can affect the research undertaken. For instance, the global financial crisis of 2009 affected several Industrial PhDs negatively, even leading to the dismissal of some.

## 5.2 The Paper Based Dissertation Format

The format and organization of this dissertation might be novel for some readers. The thesis is in the "new" PhD-format, comprised of this PhD report explaining research papers carried out from the perspective of industrial PhD research. Below is an overview of this thesis approach:

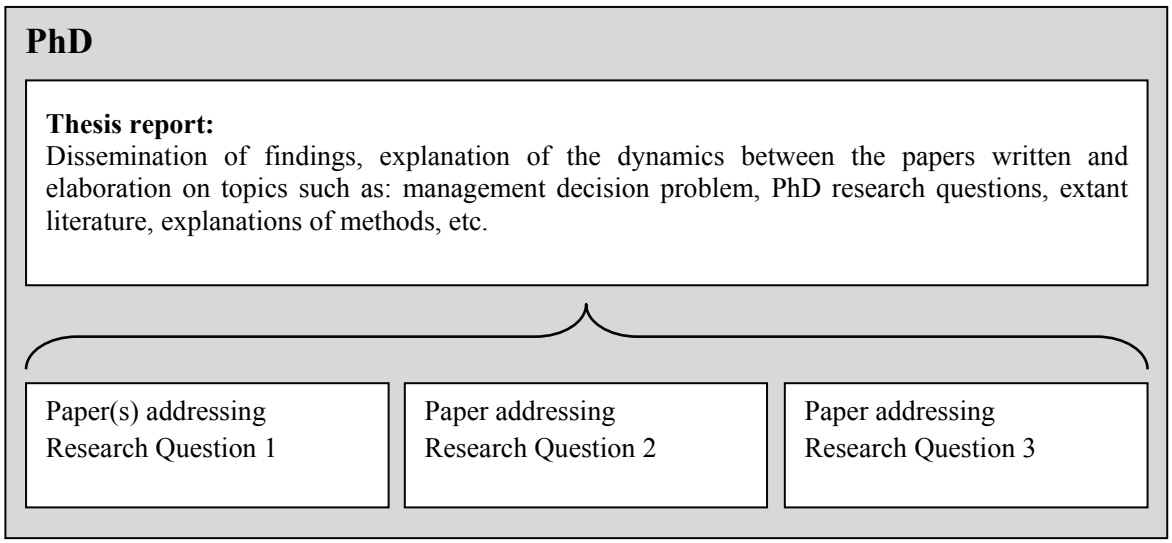



Figure 1: The paper based dissertation format. The thesis report serves to clarify the connection between papers written and the PhD research questions.

There are two main advantages to this dissertation format. First, it allows the novice researcher to break up work into smaller and more manageable parts with clear milestones. Second, the aspirating researcher can begin to generate a publication list as he becomes acquainted with the scientific publishing process.

A downside to the new format is readability. When writing several papers on the same topic and using the same case company, some redundancy is unavoidable. Each paper provides a case description and core literature references that are repeated. As for the overall picture of what actually takes place, each paper can only highlight part of the research, and thus the reading experience may appear to be staccato and somewhat abrupt. This thesis report seeks to mitigate this by providing an overview of the work done in a linear format.

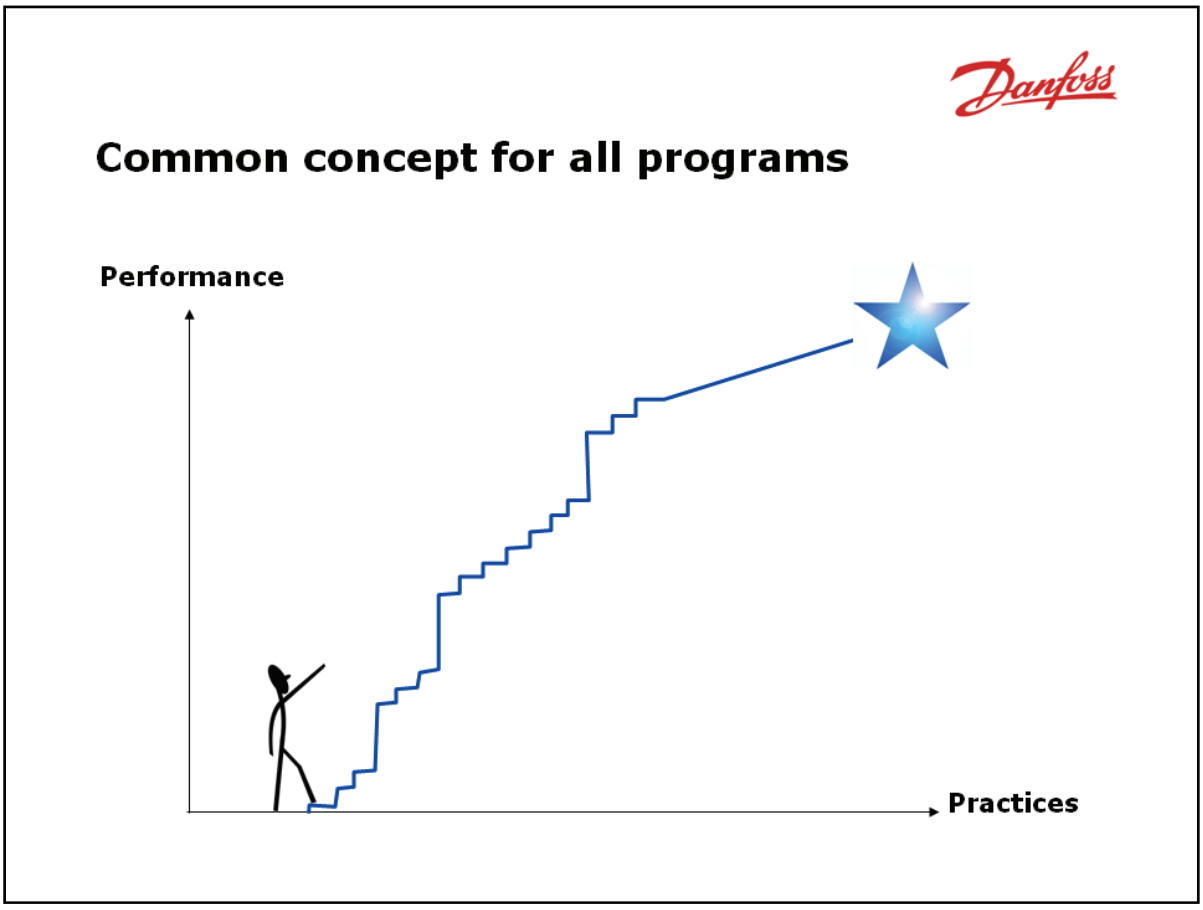
The aim of the report is to disseminate the PhD research effort made in the form of papers and to justify why this was not done in the form of five separate papers. This approach seeks to ensure a more consistent reading experience. The report is thus organized in the following manner: it provides the background for the project, the research area, the management decision problem, the research questions and the methods used to answer them and overall conclusions of the work. The findings from each paper produced are summarized and tied to the research questions posed; however, each paper is also attached in Appendices 1-5, where the reader may examine what was actually written, peer-reviewed and later published (or submitted for publication).

## 5.3 Danfoss and Danfoss Business System

The host company for this industrial PhD was the Danfoss Group[1]. Danfoss is a Danish industrial engineering conglomerate that globally supplies components within "Refrigeration and Air Conditioning," "Heating & Water" and "Motion Controls." Danfoss is a family-owned (privately held) global company, with more than 31,000 employees distributed across the world. The company has 93 factories in 25 countries and an even larger distribution network, with 140 sales companies and more than 450 agents and distributors all over the world. While Danfoss is a truly global company, it still has a Scandinavian mind-set. The global headquarters in the city of Nordborg in Southern Jutland is where the company started and is where decisions are made.

For several years, Danfoss had constantly been underperforming peer companies in terms of profitability. There were other issues such as a general lack of capability building, capability gaps, and missing leadership skills in the organization; as a result, several opportunities to improve customer satisfaction were recognized by management. In 2003 Danfoss Business System (DBS) was formed to mitigate these issues. DBS is a central department that contains several programs for improving the overall performance of Danfoss as a whole. The common concept and governing framework of DBS is shown in Figure 2.

[1] More general about The Danfoss Group can be found online: http://www.danfoss.com/AboutUs/FactsAndFigures/



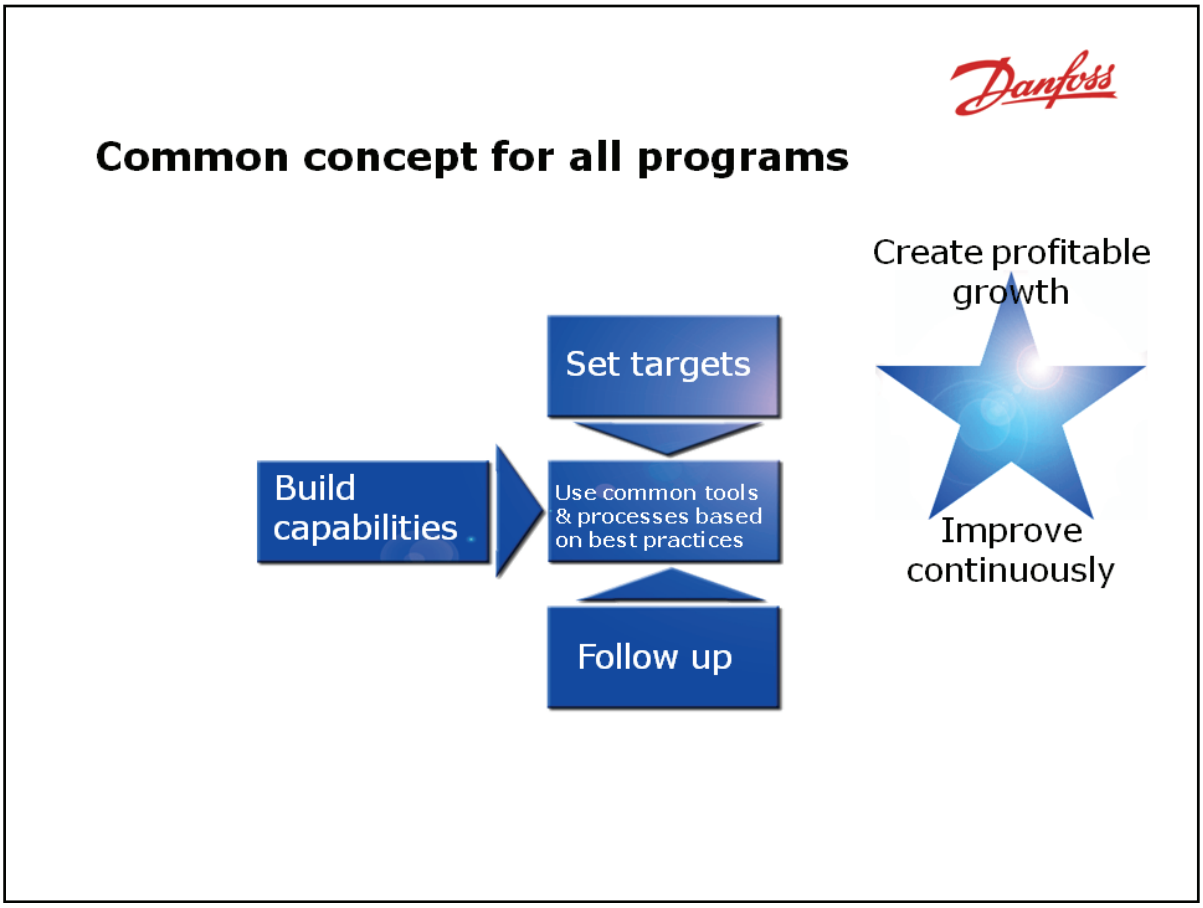




Figure 2: The common concept and governing framework of DBS (via the Danfoss Intranet).

The case of this thesis comprises the workers at DBS and the workers locally that have to use the services of DBS. DBS aims at closing the performance gap by shifting the culture of the corporation into one that is *performance driven,* while instilling workers with a mindset of *continued improvement*. Top management at Danfoss wants this change to take place across all functions in Danfoss, starting with: Manufacturing, Sales, Procurement and Product Development. Later, more programs will follow.

A short description of one DBS program can serve to aid in understanding the program-concept. The Danfoss Sales Program (DSP) focuses on transforming the sales organization, employing the same governing framework as DBS. The sales program (Figure 2, bottom) thus seeks to increase profitability, growth and efficiency via installing a set of uniform business processes across all sales departments in Danfoss. Setting and measuring targets while further building capabilities. Capability building, might be concrete training in "best practices," for instance, using different sales models for different types of customers such as key accounts, Original Equipment Manufacturers and wholesalers, as well as a set of processes for addressing i.e., Pricing (ensuring the maximum price for the products), Value Selling (a method for persuading the customer of added value of Danfoss products), Lead generation (methods for engaging new customers), etc.

Most methods are not unique to Danfoss, as similar concepts can be found in many corporations. Thus, Danfoss engaged a global consultancy firm to purchase state-of-the-art templates for "best practices." In collaboration with this consultancy firm, the templates were customized to fit the specific Danfoss context, where they reside in the DBS intranet as dynamic documents, presentations and spreadsheet tools of "best practices." The concept is that they are to be kept updated by the workers, who are the true specialists. For instance, a worker may suggest that a variable be added to a spreadsheet tool, so that additional information is taken into account when calculating the Total Cost of Ownership of a product. This would be an improvement, and thus indicate the most wanted behavior. The ultimate goal is that workers autonomously find it natural to suggest improvements and work with such a mindset, regardless of what work tasks they are engaged in. Optimally, the "best practices" are to be the object of a never-ending revision cycle dubbed 'continuous improvement.' As proven knowledge from daily operations is added by workers, the "best practices" improve and result in increased performance until "best practices" are employed globally (Figure 2, top).

Currently, dedicated DBS workers have the task of both gathering ideas and diffusing "best practices" at Danfoss, with the future vision that "best practices" and the related work will become much more self sustainable. For instance, "best practices" concerning sales will need to be documented, developed, and updated by globally dispersed sales workers as a natural part of their daily operations. Maintaining "best practices" will be a part time effort of a regional sales manager plus sales people. They will use the SharePoint® portal system as a shared working space to maintain and share sales practices, rather than have a dedicated person hired to maintain them at the Global Headquarters. This is an important part of the Danfoss strategy - shifting the Danfoss culture towards continuous improvement in order for Danfoss to perform at the same level as that of its peers. (A rich description of the case as well as the concept of "best practices" can be found in paper 4 in Appendix 4).

## 5.4 The candidate and his motivation

Humans cannot escape the fact that perceived reality lies in the eye of the beholder. As humans, we mirror reality from previous experience, memory and general attitudes. We cannot observe the 'world' from a position of "no where," for which reason, I as the researcher will describe my background.

I hold a Bachelor's degree in Rhetoric from the University of Copenhagen. During my third year I encountered (for me) a new phenomena that would shape my career: the Internet. I had been using computers since the age of six, but they were not part of a TCP/IP network. Upon my arrival at the computer lab "Humanistic Informatics" at the University of Copenhagen, I experienced networked computing, and soon after, I applied for the Master's degree education in: Design, Media and communication at the IT University of Copenhagen. My Master's thesis was on GOMS modeling (Card, Moran et al. 1983), a fine-grained HCI method for optimizing interfaces. Before my graduation, I was offered a job in industry and began working with new media at the Danish Broadcasting Corporation (Danish National Television). This, in turn, led me to working with applications for hand held devices such as mobile games, SMS extensions for television shows and Internet portals for mobile browsing. Having worked with small form factor design, I was recruited by Microsoft Dynamics to fill the role as User Experience Designer for Mobile Business Solutions. It was here that I began to use a number of tools for collaboration: online conferencing, the SharePoint® portal systems and chat.

Most importantly, it was at Microsoft that my motivation towards going back to academia began to take shape. I did not feel that I had sufficient time for in-depth contemplation of theoretical design issues as I was struggling to meet a stream of never-ending deadlines in the form of Scrum-sprints[2]. Most systems I came across, and worked on or with, seemed mapped with the underlying assumption that the user would either *have* to use them or already *wanted* to use them. Thus, the most common design approach taken was that of lowering the user's cognitive strain by supporting a set of existing tasks or already established behaviors with user-friendly software. However, I began to take an interest in situations where there was a need to have the users engage in new behaviors, and in situations where it could not be taken for granted that they would. I had been puzzled by the many "dead" intranet sites and by numerous products that simply were not accepted by users. What was at play here? If it was not a matter of mapping user needs and not dominantly one of usability, what was it then?

My PhD breakthrough came suddenly and unexpectedly when a friend informed me that The Danfoss Group was looking to hire an Industrial PhD to address knowledge sharing, creation and collaboration in online environments. I applied for the position and was accepted, and thus my three-year PhD journey began. I set out to uncover user behavior in regards to adopting and using a SharePoint® portal based KMS intended to support workers working with knowledge.

[2] Scrum is an iterative, incremental framework for agile software development.

# 6. RESEARCH AREA AND APPROACH

Structure: *This chapter describes the research area by explaining the management decision problem at Danfoss regarding the the KMS used for work with "best practices". A short example based introduction to 'persuasive design' is also provided.*

Essence: *When designing computer systems for collaboration on knowledge, we are challenged in gaining users to accept the systems. This is particularly an issue when designing and building systems whose success is dependent on multiple users exhibiting knowledge sharing behavior. Danfoss has previously had concrete problems with having such systems adopted by workers, this is critical as Danfoss' global performance strategy is depended on more sharing and developing of "best practices" taking place. This spawned the need for an investigation of how systems might be designed to result in more sharing behavior. 'Persuasive design' is a new way of addressing behavioral change via technology. From this perspective, computer systems can be seen simultaneously as 'tools' and 'medium' and can therefore be designed to invoke certain behaviors.*

## 6.1 Management Decision Problem at Danfoss

Danfoss has practical problems with getting workers to contribute to shared knowledge repositories, which is in conflict with Danfoss strategy of continuous improvement. The management at Danfoss experienced a crisis recently in regards to addressing this, that is, the issue surfaced when introducing a SAP CRM system. The system initially had severe difficulties being adopted by sales people. This, in turn, made it clear to management at Danfoss that employees would not automatically adopt purchased software. Despite some level of managerial prompting, workers generally do not use software to create and share knowledge in an altruistic fashion for the common good of the company and its profitability. Danfoss management realized the mismatch between the number of resources spent on IT systems and the actual outcome, for example, that the SharePoint® system serving as the KMS for "best practices" was ripe for redesign in order to better support knowledge sharing, development and ultimately the continuous development of "best practices." Management recognized the need for a clearer understanding of the underlying issues of the knowledge sharing problems that prevented sharing behavior from taking place, despite technologies and strategies being in place for that purpose. Danfoss recognized the value of being capable

of addressing such problems in a structured fashion, since IT was an integrated part of running their global business. This led to researching methods and strategies for designing multi user systems to attract more user contributions. The management decision problem was therefore formulated in the following way:

> How can Danfoss address the context of workers when creating Collaborative Working Environments to be deployed globally?

The research presented here is a pragmatic effort to investigate the situation of knowledge sharing in Collaborative Working Environments at Danfoss. The case comprises workers collaborating on creating and sharing knowledge centered on the common DBS concept of "best practice." Thus, the goal was to investigate ways of motivating more sharing and creative behavior in regards to those practices in an online Portal based KMS.

## 6.2 The Wider Collaboration System at Danfoss

Most of the work presented here centers specifically on the usage of the portal based SharePoint® KMS for maintaining "best practices." There is, however, a wider system context, which will be briefly described for overview purposes.

There is no lack of Information Technology at Danfoss. The wider system is predominately based on Microsoft products, but other technology extensions are also offered. Employees generally have widescreen Lenovo® laptops running Windows® XP OS. They have Internet explorer®, Communicator® chat and Microsoft® Office® 2003. Workers also have a 5 GB document folder configured to automatically synchronize (backup). They also have a second network drive, where they can save larger files if they need to. Most workers have free Windows® mobile smart phones running both push mail and having 3G mobile Internet-browsing capabilities. They also have the Interwise® system supporting multi-location meetings, where users can share their desktop, for instance, editing documents or making PowerPoint® presentations. Workers also have free access to the SharePoint® Portal server 2007 and can, without cost, create shared workspaces for whatever purpose they see fit; however, customizing sites is their own task. Using "web parts," they populate shared sites with premade components such as: document spaces, discussion boards, picture libraries, dynamic lists, shared contacts, etc. Finally, all workers can call global IT for technical support 24 hours a day 365 days a year and receive live support by phone or by letting the supporters assume remote control of the systems that are in need of repair or configuration.

## 6.3 Research approach

In the late 50s and early 60s Douglas Engelbart and his team (Engelbart, Lehtman 1988, Bardini 2000, Engelbart D. 1962) found novel use for technology in examining how we might employ computer systems to help us become more productive and smarter. They aimed at *augmenting* the human intellect, extending human capability by eliminating trivial tasks, thus freeing up time for creativity and other higher order intellectual tasks. The rest is history, as they were successful and are today credited with the invention of: the Internet, the personal computer, the mouse and several other concepts presented in: "The Mother of All Demos"[3]. This work only took place circa 40 years ago, but since then computers have become all-powerful 'tools' configurable to serve almost any purpose imaginable. With the advent of mainstream computing and the World Wide Web, we have seen a revolution as to how intellectual work and communication can be done. We have witnessed a radical change, possibly with larger implications for human kind than what Gutenberg's press had. Unsurprisingly, we have not yet reached a maturity level, where we can design computer systems and robustly predict the outcome of introducing them to users. Such a level may or may not be reachable, but in this researcher's opinion, we should strive to solve the problems that are evident between: the designer, the design and the users.

This thesis is part of that larger effort, by seeking to address a set of specific issues in regards to designing KMS at a global corporation. A major challenge is that organizations are imperfect. Organizations are not fixed structures that act in a simple, rational, or predictable manner. They are flexible, dynamic and consistently mutating. Each member of an organization has its own agenda; each actor holds his or her own perspective and rationale for taking action or not. Each actor has his own mode of thinking, tied to his own situation. It follows then that designing a KMS is a 'wicked problem' (Rittle, Webber 1973). There is not a single design solution for addressing organizations with computer systems.

If we only regard this problem by observing computers as being all-powerful 'tools,' we are not seeing the whole picture. The hammer as a 'tool' can be used to drive nails into a wall or remove nails from a wall, but it also supports secondary functions, e.g., opening a beer or serving as a door stop. However, when we need to hit a nail, we know that a hammer makes it easier to support the behavior of hitting nails than a stone does. Whether we build a shed or hang a picture is for us to decide; the hammer does not suggest anything in that regard. Users will typically not start "hammering" at random, even if provided with a hammer, unless they are in a context where hammering-behavior is rational. A word processor exhibits some of those same 'tool' traits. The word processor will not lead us in a specific direction - it simply makes writing easier. When we open a blank document, it is for us to decide if we write a book, a bank robber's note or a love letter. Naturally, using a word processor affects *how* we write (e.g., making it easy to move whole paragraphs of text), but offering users a word processor will not necessarily lead them to write more. In the same manner, creating a KMS 'tool' which theoretically allows knowledge sharing and

[3] Video of the demo can be found here: http://sloan.stanford.edu/MouseSite/1968Demo.html

development will not necessarily result in actual knowledge sharing behavior taking place. We can facilitate such behavior if users feel like sharing knowledge and want to engage in the tasks that are demanded. We can support them with software, but what if people do not feel like using them? Can we design for that? In observing KMS, we can often find a clear gap between the behaviors that software systems are designed for and the actual behavior they invoke (Coakes 2004, Bansler, Havn 2002, Orlikowski 1992). This is costly.

Multiuser computer systems, using both hypertext and rich media, and connecting people socially are not only 'tools,' as this would be a simplification of the phenomena. Such systems are a 'medium' in their own terms (Bardini 2000, Fogg 2003). They even converge all prior media epochs absorbing all other media. A computer can show a book [text], but a book cannot "show" an interactive computer system. From the 'tool' perspective, we may observe software as being neutral, but as we begin to address systems as medium, we need to discuss the 'content' of that medium and the unique traits that it imposes on the content. We cannot discuss the 'content' of word processor software. Because it is a tool, it does not have explicit content; it merely affords a certain behavior. The pen and the paper tools allow us to write, but they are not 'content' in themselves, nor is writing in itself (the symbols we use to write), since it is the understanding of the symbols that creates semantics.

Norman (2002) postulates that a design can be regarded as an act of communication between the designer and the user, since a good design allows the user to gain an insight into the conceptual model of the designed object as created by the designer (Norman 2002). Good designs communicate their conceptual models so users won't have to guess or uncover them by means of trial and error. Norman (2005) also describes how users may perceive beautiful systems as being more usable due to their aesthetic appearance rather than the effect of the system's conceptual model or interface layout (Norman 2005). This type of communication is above mere functionality, since designers can influence the user's perception by creating an experience (or illusion?) of a more usable system by means of aesthetics alone. In speaking of *affordances*, Norman (Norman 2002) borrows from Gibson (Gibson 1986). For Gibson, affordances are what the environment has to offer the user, that is, what it provides or furnishes. By describing how surfaces may (or may not) offer support for standing Gibson explains how some surfaces under certain circumstances *afford support* – they are thus stand-on-able; which is communicated by the visual and tactile traits of the surface. These concepts are rooted in a psychology of visual perception, and thus Norman is, in essence, describing the face value of objects, devices or interfaces. In other words, the visible tactile properties of a design (or an environment) can be said to communicate from designer to user. 'Persuasive design' seeks to transcend this view by actively persuading the user into engaging in an activity; rather than communicating that a behavior is 'afforded' by an object, the persuasive design suggests that you *do*. A 'persuasive design' must therefore both support a behavior and persuade it simultaneously. In observing computer systems *both* as 'tool' and 'medium,' we can use computer systems for persuasion to embed certain 'content' into the systems, making them convey certain messages to actively persuade a certain behavior.

'Persuasive design' is thus a new conceptual perspective on system design that allows us address end user behavior in a novel manner, by using technologies as both 'tool' and 'media' (Fogg 2003) to deliberately address how we might change the user's behaviors or attitudes (Fogg 2003, Harjumaa, Oinas-Kukkonen 2007, Torning, Oinas-Kukkonen 2009). This researcher first encountered persuasive design at a conference on Stanford University in 2007. During my first 6 months of research, I attended the CHI2007-conference in San Jose. Prior to the CHI conference, Stanford University hosted a smaller conference: The second international conference on "persuasive technology." It was after this conference that I focused on this evolving design approach, as I found it very appealing and included it as a core element in my PhD work[4]. At The Danfoss Group, the current KMS still has problems in attaining sharing behavior. This problem persists and it is on collision course with the long term 'continuous improvement'-strategy of the company. The question is whether this problem can be partly addressed by 'persuasive design,' that is, by creating designs which actively persuade more knowledge sharing behavior in the KMS. A hammer – so to speak – that not only affords hammering but also actively *persuades* the user into hammering.

## 6.4 A few Examples of Persuasive Design

It is quite likely that readers are more unfamiliar, rather than familiar, with 'persuasive design,' as this stance towards design is rather new; therefore, three examples of 'persuasive design' are offered to clarify the general concept of designing with the aim of behavioral change. The examples are meant to anchor the initial reading of the report. A more research-oriented description of persuasive design is offered in section 0, where core concepts and the many open issues with them are described in greater detail, as well as additional examples offered.

### 6.4.1 Tangible object: Latour's Hotel Key

We may begin by observing a simple key chain that does not involve interactive technology. Latour (Law 1991, Bijker, Law 1994) offers us this physical example of persuasive design. He describes a hotelkeeper who feels distressed that his guests do not turn in room keys when they leave the hotel. The hotelkeeper finally resolves the matter by altering the design of the keychain itself. Making the key chains heavier and bulkier, he successfully induces the behavior of turning in the keys. Since guests do not want to carry the large key chains around, they are persuaded into exhibiting the behavior that the hotel keeper aimed for: they turn in their keys. This is done via the design of the key chains itself (Figure 3), not orally or by making a sign that says, "Please turn in your key." The non-textual argument posed by the artifact is embedded in the key chain itself. The reasoning is conveyed in the usage of the object – in the user experience of the key chain.

[4] More notes on that choice and its consequences can be found in section 9.1 "Research Process"


Figure 3: The design of the bulky keychain persuades the behavior of handing in the key.


Figure 4: The external speedometer sign shows the speed (50 km/h) of the passing motor cyclist. He is able to see this when approaching the sign. The two yellow circular lights above the actual speed indicator will flash, if the motorist is exceeding the speed limit.

### 6.4.2 Environment: External speedometer

Public space offers us many examples of technology intentionally crafted to invoke behavioral change. In traffic, a common behavioral issue is to get motorists to reduce their speed in areas where this is appropriate. A digital sign designed to address this issue (Figure 4) employs a persuasive approach. The concept is simple, as the sign acts as an external speedometer fitted near the roadside. As motorists travel along the road, the sign will show their speed, and lights will flash if the speed limit is broken. Interestingly, motorists already have their own speedometer in their vehicles, but the external sign initially offers a reduction of effort, as drivers do not have to look down at their own speedometer to see the traveling speed. Such signs are deliberately placed where drivers predictably tend to ignore their own speed on their own speedometer on the cars dashboard. The designer of the sign thus ensures that speed is lowered by making most drivers look down to check if their own speedometer does indeed indicate the same speed as the sign does; thus, the persuasive design results in the exact behavior which the drivers should be exhibiting. Counter intuitively, this behavior is reinforced by adding an external speedometer in a public space.

### 6.4.3 Infant Simulator

A famous persuasive ICT example is the “Baby-think-it-over”-infant simulator (Fogg 2003, Realityworks 2010). The infant simulator is a computerized doll designed specifically to teach adolescents about the consequences of not using birth control. The designers created the doll to allow teenage girls to feel what it is like to have a baby by simulating parts of the experience. For instance, the doll will cry at random intervals both day and night and for a random duration. If picked up and cuddled, or if the user “feeds” it, the crying stops. Built in sensors track these activities and the data collected may then serve as the foundation of an informed discussion. What could be a better way to persuade someone of how hard and strenuous it is to get up at night to attend to a crying baby, than to actually wake them up and make them tend to a baby at random intervals during the night for a whole week? This mode of persuasion is very different from moral speech meant to persuade a teenage girl to use birth control by posing oral arguments such as: “You will have to get up in the night if you have a baby!” or “You will not be able to pursue your education if you have a baby.”


Figure 5: The computerized doll persuades schoolchildren into using birth control by giving them a taste of what life would be like if they were actually to tend to an infant.

# 7. RESEARCH QUESTIONS

Structure: *This chapter describes the research questions and how they were formulated.*

Essence: *Three research questions were developed to address the management decision problem at Danfoss from the perspective of persuasive design.*

At Danfoss, a gap was found between the KMS designs to make workers share and create knowledge, and the workers' actual usage of those system designs. Thus, the leading research question sprung from the management decision problem:

> How can Danfoss address the context of workers when creating Collaborative Working Environments to be deployed globally?

To anchor this question in the emerging design approach of 'persuasive design', it was simply added. To limit the scope further, emphasis was placed on web based online environments such as SharePoint®; thus, the leading research question became:

> How can Danfoss address the context of workers by employing *persuasive design* when creating *online environments* to be deployed globally?

This main question anchored the research; however, in order to transform the question into actionable research, three sub-questions were developed:

RQ1: What characterizes the situation that Danfoss workers are in when they are to share knowledge in online environments?

RQ2: What is the current state-of-the-art in persuasive design?

RQ3: How can we employ persuasive design to motivate knowledge sharing- and creating behavior, when designing online environments?

# 8. PREVIOUS WORK

Structure: *This chapter positions the PhD project in relation to the literature on supporting work with knowledge using KMS; it then discusses issues related to the concept of 'knowledge management' and describes 'persuasive design' in greater detail.*

Content: *The PhD research is placed at the intersection of knowledge management and persuasive design as an approach for invoking certain behaviors. Knowledge management is described with a focus on KMS that supports working with 'knowledge', differentiating between the "stock" and "flow" approach. It is also described how Danfoss subscribes to the "stock" approach hoping to gain a competitive advantage. The emerging research area of persuasive design is described with emphasis on the concept of behavior change versus behavioral support.*

## 8.1 KMS – working with 'knowledge'

The management decision problem at Danfoss is practical and is tied directly to systems where users are to work with knowledge, actively contributing content in the form of new ideas, improvement and cases of successful deployment of "best practices." Thus, the case for the research undertaken is that of a KMS for knowledge sharing in a corporate setting, and a few points should be made about such systems.

Hinds and Pfeffer (Hinds, Pfeffer 2002) state that: "It is generally recognized, that in today's economy it is increasingly the case that *all work is knowledge work*" (Hinds, Pfeffer 2002, p. 22, my emphasis). The authors also offer the common distinction between 'tacit' and 'explicit' knowledge (Polanyi 1966)[5]. The level of description of these types of knowledge is rather simplistic, using the argument that some types of 'knowledge' can be externalized, for instance, in writing and thus be made 'explicit' by a 'codification' effort, while other types of 'knowledge' escape such 'codification' and are inherently 'tacit.' When companies work with 'knowledge,' they typically aim at transferring knowledge between workers. To support collaborative work centered on knowledge sharing, Ackerman et al. (Ackerman, Wulf et al. 2002, p. xii) mention two views for supporting knowledge management with software. The first exploits the previously described idea of

[5] Randall (Randall 2007) however notes that Ryle (Ryle 2000) was the first to employ this distinction, which is used in most literature on knowledge management

'externalizing' knowledge, and recommends placing such knowledge in shared repositories. The second view relates to the sharing of the 'expertise' stance, which focuses on 'human components'. Huysman and Wit (Huysman, Wit de 2002) describe these two positions as the "stock" and "flow" approach. The flow approach aims at connecting workers, for instance, via people finder systems, rather than aiming at having workers spend energy on externalizing what they know.

The concept that 'knowledge' can indeed be made an object of management has its roots in a movement that took place from the late nineties onwards. Here, a knowledge based perspective of the firm emerged in strategic management literature (Alavi, Leidner 2001). The perspective promises firms long-term competitive advantage by working in a structured way with 'knowledge' (von Krogh 1998). This is done from different positions: organization and innovation (Nonaka 1991, Nonaka, Takeuchi 1995, Nonaka, Konno 1998), macroeconomics (Drucker 2005) and strategic management (Spender, Grant 1996, Grant 1996). Much has been written about knowledge management, but Kreiner notes that the voluminous literature on knowledge management symbolizes the difficulty of getting a handle on knowledge rather than an extended universe of solutions (Kreiner 2002).

In addressing several issues in regards to the way in which a concept of knowledge is presented in research literature, Alvesson and Kärreman (2001) argue that: "Knowledge is an ambiguous, unspecified and a dynamic phenomenon, intrinsically related to meaning, understanding and process, and therefore difficult to manage" (Alvesson, Karreman 2001, p. 995). Since 'knowledge' has a weak and ambiguous definition, the derived term 'knowledge work' also suffers from vagueness. Building on, among others, Drucker's work, Schultze (2000) describes 'knowledge work' as characterized by: producing and reproducing information and knowledge, being cerebral thus involving the manipulation of symbols and abstractions; as denying routinization, thus requiring creativity to produce (idiosyncratic esoteric) knowledge; and by requiring formal education. It is implied (not only by Schultze) that a key differentiator in regards to 'knowledge work' in reality depends on whether workers are sitting behind a desk or not. However, playing the devil's advocate, we may question whether work exists that requires no 'knowledge.' For instance, does a blue-collared production worker operating specialized machinery not work with 'knowledge' while coordinating a crew of machinists? Does his work not involve the manipulation of symbols and abstractions? Does it not deny routinization? Such questions are left open or perhaps simply unanswered… Regardless, both 'knowledge,' 'knowledge work' and 'knowledge worker' are terms that have been widely adopted since the early 90s, and many companies have sought to address 'knowledge' by managing it (Coakes 2004).

At Danfoss, the movement to manage knowledge has also played a large role. With the help of a consultancy firm, Danfoss sought to transform its business by working with knowledge from the general strategic perspective of knowledge – or in the terms of Huysman and Wit (Huysman, Wit de 2002), the "stock" approach. At Danfoss, the DBS intranet thus serves as a repository of codified knowledge in regards to "best practice." From this "stock" perspective, knowledge of "best practices" is seen as being a strategically important resource that Danfoss possesses and may use to gain and maintain a competitive advantage (von Krogh 1998). Following this perspective, Grover and Davenport (Grover,

Davenport 2001) describe the 'knowledge process' as comprised of three generic sub processes: knowledge generation (acquisition and development of knowledge), knowledge codification (conversion of knowledge into accessible and applicable formats) and knowledge transfer ("moving of knowledge from its point of generation or codified form to the point of use"); these processes are seen as recursive (Grover, Davenport 2001). This perspective on knowledge sounds practical, but we are typically not provided with a recipe to make it operational. On an operational level, we however face many difficulties in managing knowledge. While knowledge is a desired object of management, the desire to manage knowledge is not mirrored by an immediate ability to do so (Kreiner 2002). Huysman and Wit (Huysman, Wit de 2002) offer a good working definition of knowledge management success, namely, that it is to become a routine part of daily work:

> "With successful knowledge management we refer to practices of knowledge sharing that have become embedded in the ongoing work process of an organization. In other words, we perceive the success of knowledge management as related to the degree in which sharing knowledge has become a taken-for-granted part of the routine practices within the organization."
> (Huysman, Wit de 2002, p. 34)

At Danfoss, the success could thus be seen as workers treating work on "best practices" as a taken-for-granted part of the routine practices within Danfoss. In other words, it should be routine that workers at Danfoss collaborate on improving "best practice" documents, presentations and spreadsheet tools. However, determining the requirements for a KMS system which can truly support and invoke such collaborative work is not a simple matter. Considering that web based portal KMS are the de facto standard in many corporations, we know very little of them. We do know that system designers face several challenges when designing such systems for working on knowledge, but it is harder to determine how to resolve the issues. Jonathan Grudin (Grudin 1994) outlined several problems for 'groupware' applications, among them: disparity between the work and the benefit deriving from the software, difficulty in evaluating and analyzing such software which thus makes it hard to share experiences, lack of critical mass and the prisoner's dilemma and additional demands to managers since multiuser software demands more managerial support. Turning to case studies of corporations on an organizational level, the authors reveal difficulties in regards to addressing workers with software, especially if workers work with and share knowledge online. One of the most famous studies is Orlikowsky's (Orlikowski 1992) study of Lotus Notes, being deployed in a large consultancy firm indicating issues regarding reward structure, unclear work procedures and failure stemming from firm culture and work norms, while internal competition and lack of training in using the system are also inhibited in system usage. Bansler and Havn (Bansler, Havn 2002) describe a large initiative in the pharmaceutical industry and why it failed at creating an environment of knowledge sharing; despite top-level management backing it up, the system was not adopted. Four reasons are given: time pressure, lack of incentives, the problem of being perceived as bragging if one highlights his own knowledge as being good and, lastly, the importance of personal

networks necessary in order to succeed (documents and databases being of minor importance). Hinds and Pfeffer (Hinds, Pfeffer 2002) also note two issues in regards to the usage of such systems: cognitive limitation (a gap between the novice and the experts when sharing expertise and the issue of articulating tacit knowledge), and motivational limitations (competition or complex organizational processes and lack of trust as disincentives).

In summary, we can conclude that it is difficult to design KMS supporting knowledge sharing and development in a manner where the end-users truly adopt them and thus clearly *exhibit* sharing behavior. We do not have any robust models for creating requirements for such systems or designing them in a fashion that leads to predictable results. The case presented here aims at uncovering problems that system requirement needs would have to address at Danfoss if the system were to motivate more knowledge sharing behavior in a company that subscribed to the strategic management (or "stock") view of knowledge.

## 8.2 Persuasive design

This researcher has encountered three pitfalls when discussing 'persuasive design' with researchers. The first has to do with phonetics, "persuasive" almost sounds like "pervasive" and many researchers' associate it directly with ubiquitous computing. The second pitfall is an association with the field of Computer Mediated Communication. The third pitfall is that researchers find the notion of "design persuading" too conceptual, and they simply refuse to accept that persuasive design is novel. The following will seek to mitigate these pitfalls by offering an introduction to persuasive design. The reader may also refer to paper 3 in Appendix 3 for a structured literature review of the current state-of-the-art in persuasive design and to section 10.2 for a summary of this paper.

'Persuasive design' is a new area, and the terminology has not yet been solidified. Some refer to "Persuasive Technology" (Fogg 2003, Fogg 1998, Fogg 1999), others to "Persuasive Systems" (Oinas-Kukkonen, Harjumaa 2009, Oinas-Kukkonen, Harjumaa 2008), and still others speak of "Design with Intent" (Lockton, Harrison et al. 2009, Lockton, Harrison et al. 2008). This research refers to all these design approaches as 'persuasive design', a term first coined by Redström (Redström 2006), and thus deviates from the more popular term "Persuasive Technology" that was the first term used, as it is considered to be inherently flawed. B.J. Fogg (Fogg 1998) coined the term and it has gained wider acceptance with his book "Persuasive Technology – Using Computers to Change What We Think and do" (Fogg 2003):

> "I define Persuasive technology as any interactive computing system designed to change people's attitudes or behaviors."
> (Fogg 2003, p. 1)

The definition is problematic, as Atkinson (2006) is the first to point out. In speaking of "persuasive technology," researchers' tend to end up anthropomorphizing machines (Atkinson 2006). Persuasion is, however, a *human* activity; it is something that humans

engage in when they seek to move each other verbally by using symbols (Miller 2002). 'Technology' is not capable of having thoughts and conjuring strategies for intentionally imposing them on humans – 'technology' does not persuade us of its intentions, for the simple reason that it has none. Persuasion is a strictly human act.

Another problem lies in limiting the scope to interactive computing systems. Why omit technology that is not computer based? Fogg offers no reasoning for the delimiter, but simply draws the line. He defines the research of "Persuasive Technology" as the intersection of computers and persuasion, and names it "captology" (Fogg 2003):

> "Captology – the study of computers as persuasive technology – focuses on Human-computer Interaction (HCI), not on computer-mediated communication (CMC). Specifically, captology investigates how people are motivated or persuaded when interacting *with* computing products rather than *through* them" (Fogg 2003, p. 16).

Fogg states that "Captology" focuses on endogenous intent, that it is the intent that has been designed into the product (Fogg 2003) (p.17). Thus, for Fogg, the phenomenon explored is a class of interactive computer based objects created by man, with the clear intention to change the user's behavior or attitude:

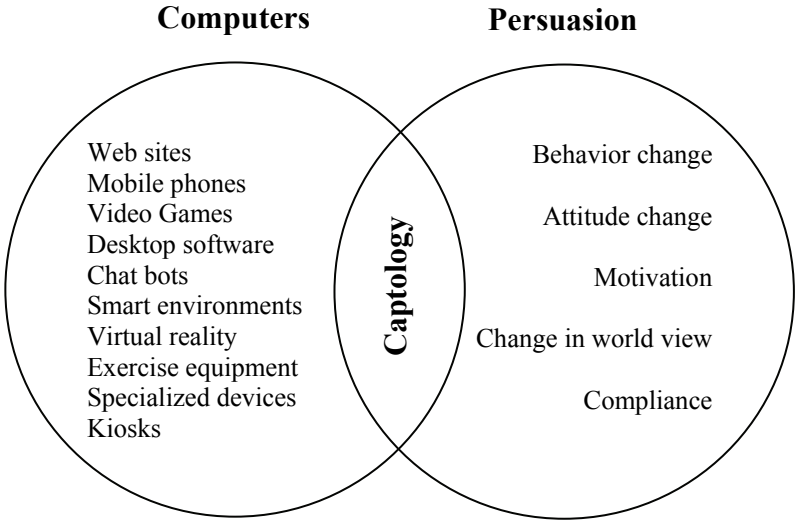



Figure 6: "Captology describes the area where computing technology and persuasion overlap" – After Fogg (2003, p. 5)

However, the term "Captology" has not been widely adopted; rather, researchers tend to refer to "Persuasive Technology" as if the technology itself could persuade, proving Atkinson's point in regards to anthropomorphizing (Atkinson 2006).

Another set of concerns stems from ethics, and Atkinson notes that Fogg does not fully address the ethical implications of designing "Persuasive Technologies," stating that: "We are left with the huge philosophical question: Is computer-mediated persuasion ethical? ... Is it ethical only if they [users] are aware of the intention from the outset of their participation

with the program?" (Atkinson 2006, p. 179). Johnson (Johnson 2004), in his review of Fogg's book, points to a different set of ethical issues, for instance, that there is no grey area in Fogg's definition of "Captology" ethics, since Fogg only offers a binary approach, where the designer is either ethically accountable or is not.

Another serious critique of "Captology" is raised by Johnson (Johnson 2004), as he points out that the whole approach seems to be designer and system centered, and that it includes few (if any) examples of user testing of products in early development stages (Johnson 2004). The critique is justified, and the phenomenon which Fogg describes is conceptual, an issue that can only be resolved by research, which Fogg does not offer.

Lastly, the final concern raised by Johnson is that Fogg, in taking a multi disciplinary approach in defining the area of "Captology," does not fully take into account the many disciplines that it draws upon (Johnson 2004). This critique may be justified, however, there are many disciplines to consider (Torning, Oinas-Kukkonen 2009), which would make it very demanding to exhibit in-depth awareness of all aspects of them.

Fogg (or anyone else) has yet to refute the plethora of critiques offered by Johnson and especially Atkinson. Regardless, Fogg's work remains seminal and very influential for the emerging research area. His main contribution is undeniable: Researchers have begun to address the unique properties of objects in regards to persuasion.

### 8.2.1 'Persuasive' and 'design'

This researcher's stance towards researching the phenomenon of objects intentionally crafted to persuade users is clear. This area of investigation is referred to as 'persuasive design' (Redström 2006), which is not limited to computer based technology. Further, readers are owed an explanation of what is meant when referring to the terms: 'persuasive' and 'design.' Here pragmatic working definitions are offered. The purpose is not to offer an exhaustive account of both concepts, but rather to give a notion of what they are and what they are not, within the scope of this thesis.

It is not possible to speak of persuasion without recognizing the rhetorical tradition. Aristotle defined the area: "Rhetoric may be defined as the faculty of observing in any given case the available means of persuasion." (Aristotle 2010). Today, these means have come to include design. For Aristotle, rhetoric was neutral and could be "used by persons of virtuous or depraved character" (Rapp 2010), which is why ethics plays a central part in the tradition of rhetoric, as it is possible to cause much harm with rhetoric. As for persuasion itself, Miller (2002) offers the following practical definition of persuasion:

> "In popular parlance, 'being persuaded' is equated with instances of behavioral conversion; that is, individuals are persuaded when they have been induced to abandon one set of behaviors and adopt another"
> (Miller 2002, p. 6)

Miller goes on to describe that 'persuasion' relies on symbolic transactions to create new meanings that would allow a person to abandon one behavior and adopt another (Miller 2002). Thus, if we speak of 'persuasion,' we are talking about humans *deliberately* employing symbols with the intention to change the recipients' behavior or attitudes. This definition of 'persuasion' resonates with a modern definition of rhetoric:

> "When we say that rhetoric is an action humans perform when they use symbols for the purpose of communicating with each other, we are saying four things: (1) rhetoric is an *action*; (2) rhetoric is a *purposive* action; (3) rhetoric is a *symbolic* action; and (4) rhetoric is a *human* action"
> (Foss, Foss et al. 1985, p. 14, original emphasis).

As seen, this definition of rhetoric does not leave any room for anthropomorphizing. Rhetoric is a *purposive symbolic action* that *humans* undertake in seeking to communicate with each other.

Notably, coercion is not persuasion. When coercion takes place, we have intentionally shaped symbols to mislead the recipient unfairly, depriving him of the opportunity to evaluate the suggestion made on his own terms. For instance, threatening statements such as "Hand me your money or else!" is not considered to be a rhetorical act of persuasion, and neither is lying, since readers (or users) are tricked rather than persuaded - the latter being a rather common strategy on the Internet:

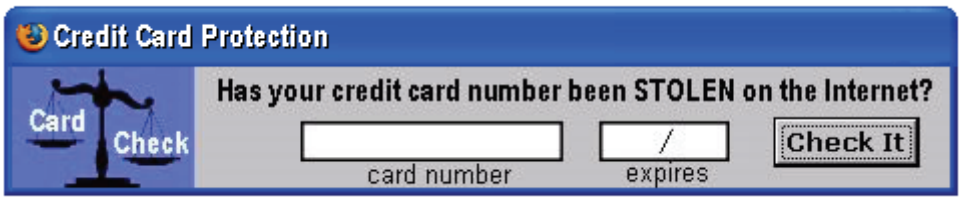



Figure 7: Example of internet coercion of unknown origin.

Persuasion relies on making a proper symbolic appeal to the recipient of the communication, allowing him to make an informed decision of his own free will, e.g., to change behavior or not. When the recipient (or user) is not offered the opportunity to form such an opinion, coercion might be at play, which makes designing technology that aims to persuade especially difficult, seen from the perspective of ethics.

As persuasion, 'design' is marked by intention:

> "Engineering, medicine, business, architecture, and painting are concerned not with the necessary but with the contingent – not with how things are but with how they might be – in short, with design"
> (Simon 1996, p. xii)

This approach towards design is fundamentally a problem solving paradigm (Hevner, March et al. 2004). Whenever we design, we do so to change an existing state to the next. The focus is on usefulness and results: "Whereas natural science tries to understand reality, *design science* attempts to create things that serve human purposes" (March, Smith 1995, p. 253). Such purpose is defined by humans intentionally deciding what to address. While employing such a definition may provoke some, since engineering, medicine, business, architecture and art may not be thought of as "sciences" per se (March, Smith 1995), from the perspective of design as a science, we are not concerned about ontology and reality, but rather with utility (Hevner, March et al. 2004).

As seen, both 'persuasion' and 'design' are deliberative acts aiming to *transform* the current state into a new one and therefore they do not resist combination – rather they hold the potential to be synergistic. As the components aim to transform, so does the combination: A persuasive design always seeks to *transform* the user. This change springs from the designers wish to change the existing state, and for the same reason, a persuasive design is never neutral, as it is intrinsically oriented towards making users change their minds. Employing this stance towards behavior change, we may begin to regard designed objects as a new medium for embedding symbols. When we engage in persuasive speech, we shape our communication to persuade listeners by embedding symbols in sound waves; when we engage in persuasive writing, we shape our communication to persuade readers by embedding symbols in writing; and when we engage in persuasive design, we shape our communication to persuade users by embedding symbols into design. Each of these activities can be undertaken with the aim of deliberatively invoking a *transformation* in the listener, reader or user.

We may thus begin to research which unique persuasive qualities (for instance, ICT) products or architecture might have if we would like construct them, specifically with the aim of invoking a certain behavior. The following sections seek to make this clearer, explaining why this is novel and offering concrete examples of it.

### 8.2.2 A New Area of Research?

Johnson (Johnson 2004) points out that the prominent researchers, Donald Norman and Jacob Nielsen, in their roles as advanced reviewers of Fogg's seminal book (Fogg 2003), speak with excitement of a new 'discipline' being formed by Fogg, but they do not provide arguments to support that claim. It is possibly a matter of tradition for reviewers to praise work; however, if we want to address the matter more seriously, we would have to address why persuasive design as a research area *is* novel. This research seeks to do so from a pragmatic approach, describing its difference to the existing and its potential utility by placing it into the context of society. As Redstrøm (Redström 2006) postulates:

> "As a new research area emerges it faces certain challenge: on one hand it needs to build on what is already there; on the other, it needs to differentiate itself from its surroundings as to motivate its existence" (Redström 2006, p. 112)

When designing to *support* a behavior, we imply that the behavior, or at least the goal of the behavior, predates the design itself. However, in many situations, we need to persuade a behavior rather than support an existing one. For instance, western society's health challenges such as: obesity, alcoholism, Internet addiction and medical non-compliance, can only be resolved by infusing individuals with the motivation to engage in long lasting lifestyle behavioral changes (WHO Regional Committee for Europe 2008). The existence of persuasive design is motivated by observing such real life societal problems where it would be beneficial to invoke behavior change rather than supporting existing behavior.

Traditional ICT design methods typically focus on *supporting* existing behaviors, rather than invoking novel ones. A common approach is to lower the user's cognitive burden in performing the target behavior, consequently making it easier to perform. Examples of such methods include Human Computer Interaction methods that lower the burden of using interfaces from the stance of cognitive psychology, e.g., GOMS (Card, Moran et al. 1983) or modeling a systems over all usability (Krug 2005, Nielsen 2000). Another set of models addresses the wider system context and seeks to understand users' true needs by uncovering which behaviors to support. This can take the form of User Centered Design (Beyer, Holtzblatt 1998, Holtzblatt, Wendell et al. 2005) or long-term ethnographic observations (Randall, Harper et al. 2007). Others, following the tradition of participatory design, seek to uncover the user's true needs by enrolling them in collaboration with the designers (Muller, Kuhn 1993, Kensing, Blomberg 1998).

Observing a concrete design case may exemplify the potential shortcomings of such methods aiming at user *support*: What if society wants to prevent teenage obesity and therefore commissions mobile phone software to motivate teenagers to spend more time on physical exercise? Clearly, this problem does not pertain to lowering the cognitive burden of an existing behavior, neither does it uncover which behavior to support; rather, the problem can be resolved only by actively *invoking* a behavior (or set of behaviors) by transforming the users' mindset.

While persuasive design in the words of Redstrøm (2006, p. 112) "…needs to build on what is already there..." it must also seek to transcend it, by developing new design methods to truly address behavior change. Naturally, persuasive design cannot escape its roots, and contemporary methods are heavily inspired by methods from Computer Science that are meant to support existing behaviors, rather than invoke new ones. For example, Fogg has produced three different frameworks, with each offering a new approach (Fogg 2003, Fogg 2006, Fogg 2009b, Fogg 2009a). Each seeks inspiration from HCI and attempts to link behavioral- and cognitive psychology. Lockton et al. (2009) have produced a method mostly focused on "persuasive design patterns" (Lockton, Harrison et al. 2009). Oinas-Kukkonen and Harjumaa (Oinas-Kukkonen, Harjumaa 2009) have developed the most extensive framework with many parameters from the tradition of Information Systems.[6] Echoing Johnson's (2004) critique of Fogg, all the persuasive design frameworks underexpose the 'persuasive' aspect of persuasive design; for instance, they do not take much communication

[6] I employ this model both in paper 3 and 5 (Appendix 3 and 5).

or rhetoric into account. In addition, the work presented is only to a lesser degree founded in empirical studies. Researchers do not offer much information about how they shaped their models or how the individual components of the models are found to contribute to the resulting designs persuasiveness. The models have also not been rigorously tested with designers and users and, as such, framework authors cannot exhibit a clear chain of evidence. They do not provide design cases where a clear behavior problem has been resolved employing their models. This is a serious problem that researchers must address, but as persuasive design is still in its infancy, it is perhaps not surprising that models are still conceptual and in development.

### 8.2.3 Examples of ICT based Persuasive Designs

Given the definition offered in the previous sections, persuasive design is very broad and we can find many examples of it. Here, three persuasive design examples are offered to make clearer why this design approach transcends other previous design approaches.

***perFrames: Persuasive Picture Frames for Proper Posture***

| | |
|---|---|
| Intention: | Poor sitting habits and bad sitting posture are often the cause for musculoskeletal disorders such as back pain for office employees that carry out the majority of their work sitting in front of computers. |
| Neutral design: | The average office environment is designed neutrally and does not suggest anything in regards to exercise habits. |
| Persuasive Design: | Developing a persuasive interface in form of an interactive picture frame which integrates unobtrusively into the working environment. The frame contains a moving portrait of a person the employee loves or likes and provides affective feedback in order to persuade employees to use better sitting habits while working with a computer (Figure 8). |
| References: | (Obermair, Reitberger et al. 2008) |

*Figure 8:* The perFrame prototype (center of image) implemented with a tablet PC.

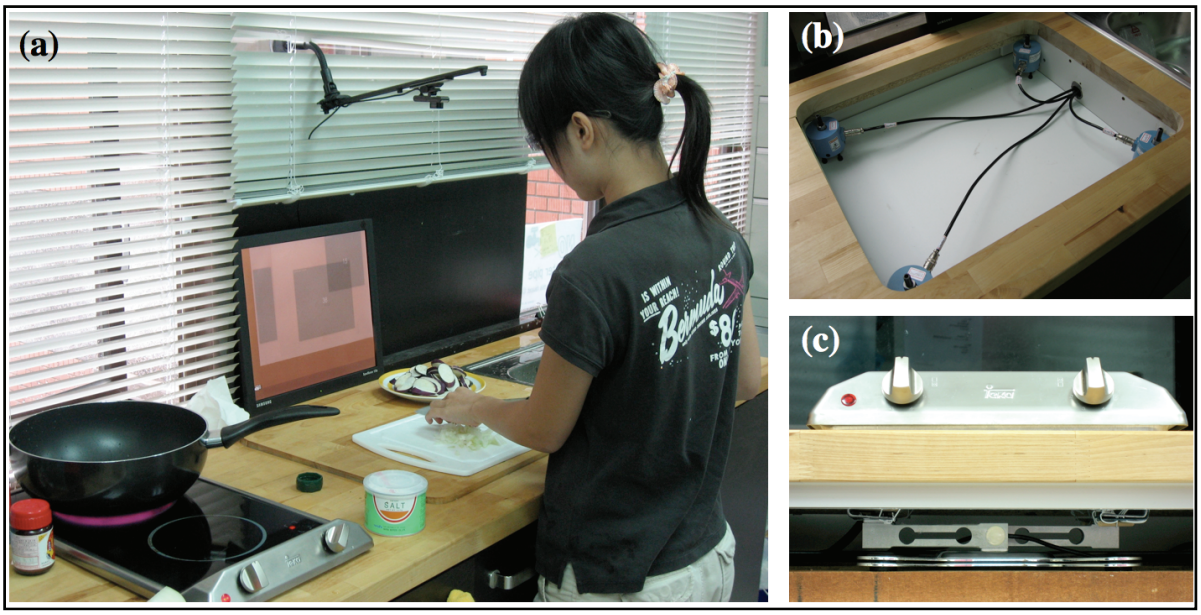



Figure 9: (a) Calorie-aware Kitchen with digital feedback of calorie information during the cooking process. An overhead camera is deployed over the counter. Weighing sensors are deployed under counter (b) and stove (c).

***A Kitchen That Persuades Healthier Cooking***

| | |
|---|---|
| Intention: | In western society, it is a general problem that citizens either cook unhealthy foods or simply purchase premade foods. |
| Neutral design: | The average kitchen is designed neutrally and only provides the capability to prepare foods. It does not suggest anything in regards to cooking. |
| Persuasive Design: | The kitchen is enhanced with a system that actively persuades the behavior of cooking more healthy foods by making the kitchen more "intelligent" so that it offers a clear indication of calories spent and warns when too many have been added (Figure 9). |
| References: | (Chi, Chen et al. 2008) |

***Shaping Social Beliefs of Rural Women in India***

| | |
|---|---|
| Intention: | Women in rural India should have access to the current health interventions that have been invented, but are prevented by orthodox socio-cultural norms and user irrational behavior related to healthcare, especially awareness about menses and maternal health. |
| Neutral design: | The existing ICT-based system provides an overview of the prevailing diseases, but does not address domain specific information needs of users, such as maternal health, menses, or diarrhea. Additionally, semi-illiterate users are dependent on community health workers to access information. |
| Persuasive Design: | A persuasive system employs an icon based keyboard, and information is presented by audio visual aids in local languages and is designed using the theory of planned behavior, employing social cues to persuade (Figure 10). |
| References: | (Parmar, Keyson et al. 2008) |

Figure 10: System designed persuasively to mitigate socio-cultural norms.

As the above examples indicate, designers can use design itself as a vehicle of persuasion by embedding their intentions into objects in novel ways that transcend what we normally would consider behavior ‘support.' More examples in many different domains can be found in the Persuasive Conference Series (Chatterjee, Dev 2009, Oinas-Kukkonen, Hasle et al. 2008, de Kort, IJsselsteijn et al. 2007, IJsselsteijn, de Kort et al. 2006).

# 9. RESEARCH PROCESS AND METHOD

Structure: *This chapter explains the research process and the methods chosen for data generating to address the research questions.*

Essence: *The research process was iterative and the majority of work was done adopting an ethnographic stance, thus using qualitative methods to generate data in order to understand the culture at Danfoss on the terms of workers there. A crisis surfaced in regards to RQ3, as findings from RQ1 and RQ2 clearly showed that persuasive design could not play a large role in addressing sharing behavior at Danfoss.*

## 9.1 Research Process

The research presented here is grounded in two field studies, a structured literature review and a prototyping workshop conducted at The Danfoss Group. Primary research took the form of an explorative field study (Paper 1 and 2, Appendix 1 and 2), a subsequent in-depth ethnographic field study (Paper 4, Appendix 4), and a design workshop held with users as an experiment to validate with users whether a persuasive design could solve the issues uncovered by field work (Paper 5, Appendix 5). The secondary research took the form of a structured literature review of persuasive design (Paper 3, Appendix 3).

The research did not play out in a linear fashion. During the three years of research both academic and non-academic factors affected the effort to answer the research questions. The following is limited to presenting a few of these.

Being engaging in industrial research, as the researcher, I was presented with a set of problems. As I joined Danfoss, I knew nothing about the organization. For me Danfoss was "just" a strong Danish brand which presented me with the opportunity to engage in an industrial scholarship, which also aligned with my personal career goals. However, the project I undertook was not especially anchored in the department where I was to conduct the research. The decision to embark on a research effort had been made centrally, and thus, my departmental colleagues did not know why I was there or what was to come of it. Sadly, after some months, my then nearest manager fell ill with cancer, which later caused his untimely death. This pushed the project into drift, as there was no one to assume the same responsibility of it. This meant that there were very different expectations towards what my work was to accomplish. While the central department had one set of ideas, in daily operations my local department was pressed for time, and would, to a large degree, rather

have me engage in plain work other than research, and thus the result was "noise" in the project.

An issue that surfaced repeatedly was a mismatch of pace. The rhythm of business is much faster than the rhythm of research. To provide any scientific insights into a problem, one simply needs more time than what the average business report written by either internal or external consultants allows. The quality of these two types of knowledge is naturally very different, and it has proved to be an issue in the research, since "fast" was often considered to be better than "thorough". Even more fundamentally, there was, to some extent, a mismatch of interests. In today's business world, the pace is so rapid, that focus areas, "burning platforms" and departmental strategies may change every quarter. Taking part in the Danfoss quarterly meetings, for instance, revealed that from one quarter to the next "best practices" were given different priorities. Similarly, the KMS that I was investigating was not deemed to be equally important throughout the three years, there was lack of clarity on the effort needed for PhD research, and there was the mindset that it was thus up to me to maintain the work, and that I was still researching it.

The engineering culture at Danfoss also posed a challenge. Most evidence presented in meetings and also in informing decisions took the form of quantitative data, for instance, Excel spread sheets visualizing graphs generated from data. Notably, at Danfoss, qualitative evidence was not regarded as being equal to quantitative evidence, and thus it took some justification to employ interviews and observations as the data generation mechanism for informing decisions, which was somewhat a surprise for me.

From an academic perspective, several issues would, in turn, shape the project. Naturally, as a PhD student, one is just that: a student lacks research experience and has to absorb complex concepts while both finding a role and an identity as a researcher. As in every area, experience is essential – we cannot become great chefs from simply reading recipes. It demands many hours of work and trial and error to be able to prepare a gourmet meal. As a novice researcher, one needs not only to learn, but also to make decisions, which can have consequences that are not always foreseen. By far the most serious issue that I ran into was the choice to explore persuasive design itself. My supervisor flagged this issue several times and other senior scientists were openly very skeptical towards addressing the issue of non-sharing behavior by means of persuasive design. I was, however, unable to see this myself.

During my first 6 months of research, I attended CHI2007 in San Jose. Prior to CHI, Stanford University hosted a smaller conference, the second international conference on "persuasive technology." As I was traveling across the Atlantic, I attended both and I soon fell in love with the idea - using the design itself as a medium for persuasion could serve to address knowledge sharing in a novel way. After I returned, I made sure that this was the focused research agenda and that the research questions were formulated to support this. Later, after working for about 1½ years longer, I had uncovered so many issues with knowledge sharing at Danfoss that the approach seemed less feasible. Fieldwork had uncovered many cultural issues and it seemed quite clear that the severity of them would far outweigh any technological design that I might invent. At its core, it was simply not a technology problem (Paper 4, Appendix 4). However, my research had reached a point of no

return, and I still attempted to address the situation by means of persuasive design as best I could (Paper 5, Appendix 5). The work did produce several interesting findings, which can serve as a scientific contribution to the area of persuasive design, but unfortunately, it contributed to improving the current state of the KMS at Danfoss to a lesser degree. While some concepts tested in the user workshop (Paper 5, Appendix 5) later made it into production at Danfoss, it was only a small subset of the persuasive design intended, and it did not resolve the cultural issues at Danfoss.

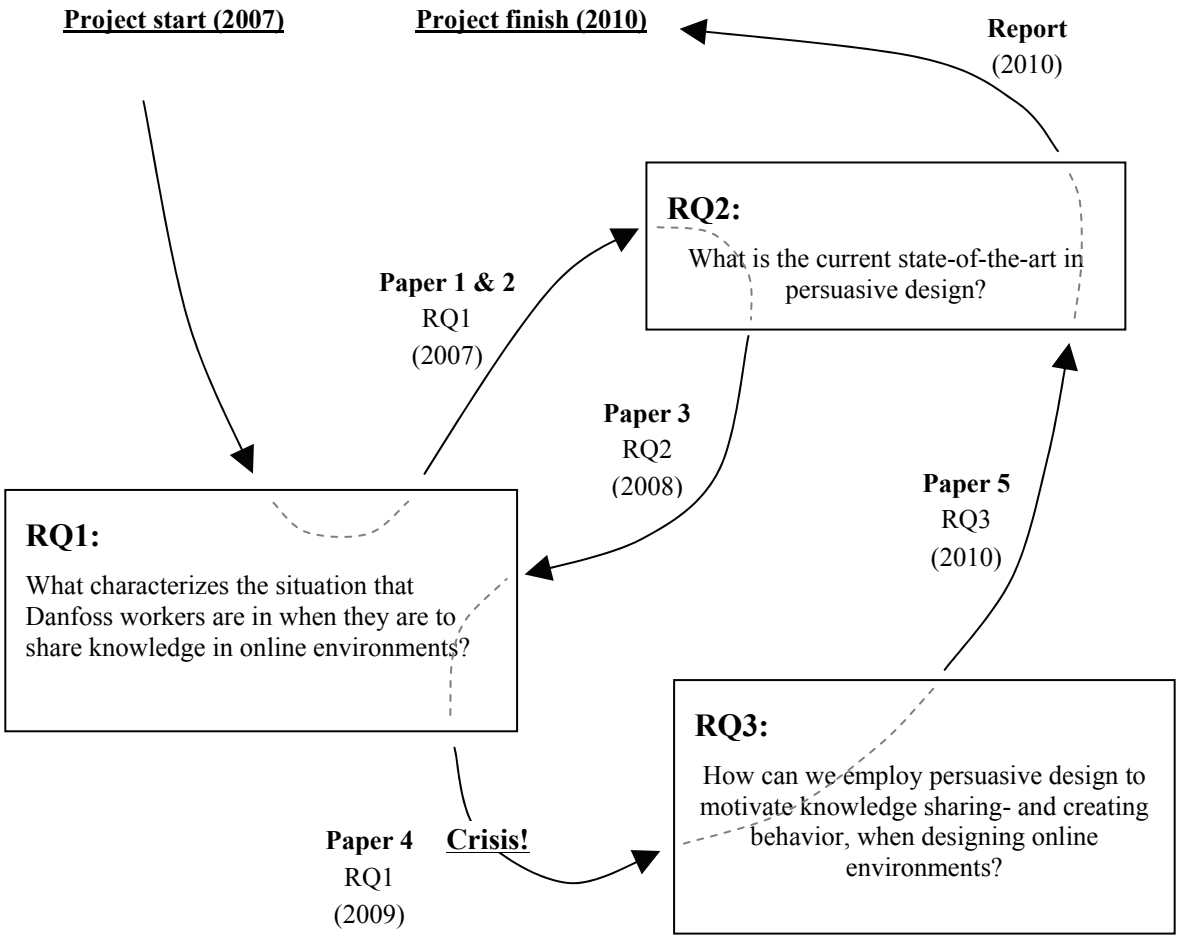



Figure 11: The iterative research process

In summary, most work was done on research question 1. It was addressed two times and in greater depth than was research question 2, and especially more than research question 3; this was because the studies of the culture at Danfoss was where the most interesting data surfaced. Thus, the main contribution of the work presented here is an ethnographic account of the situation of workers at Danfoss who were to share knowledge (especially in paper 4, Appendix 4). The findings affected the research choice of employing persuasive design negatively, as they indicated that persuasive design would not be able to resolve the many cultural issues found to be the root cause with regards to attracting contributions to the Danfoss KMS.

## 9.2 The Main Method for Data Generation

I mostly generated data following the European CSCW ethnography tradition (Randall, Harper et al. 2007). I chose to regard the SharePoint® based KMS at Danfoss, as a CSCW-system where workers were working and collaborating on knowledge artifacts. I did so since the field of knowledge management does not offer similar methods or traditions for engaging closely with workers in their natural work environment.

Taken literally, 'Ethnography' means "people writing" (~writing of people or cultures) and it has a dual meaning, as it is sometimes simultaneously referred to as the method of research and the written product of that research (Bryman 2008). Patton (Patton 2002) states that the fundamental question of ethnography is: "What is the culture of this group of people?" (Patton 2002, p. 81). Thus, when engaging in ethnography, the researcher immerses himself into a group for an extended period of time (Bryman 2008), with the objective of studying the meaning of the behavior, the language, and the interaction of a group sharing a culture (Creswell 2007). The one basic assumption of ethnography, then, is that it is a method for understanding what activities mean to the people, and what they do to them (Harper 2000), and thus ethnography becomes the enterprise describing the world *as perceived by those within the world* (Harper 2000).

In European CSCW-research, ethnography has traditionally been employed to gain an insight into the logic of, and causalities between, users and technologies employed in solving work related tasks. This has been done to inform designs:

> "The advantages of using ethnographic methods in CSCW for studying work lie in the way it promotes the real-world character and context of work; in the opportunity it provides us to ensure system design resonates with the circumstances of its use"
> (Randall, Harper et al. 2007, p. 4)

Employing ethnography for studying technology, users, and the culture they are in, has proven valuable. Some early and influential examples include the Lancaster traffic control studies (Harper, Hughes et al. 1989) and the study of London underground control rooms (Heath, Luff 1991). Such studies proves the value of spending a *prolonged* time studying people working and asking questions to have them both comment and explain their own work. By employing the qualitative in-depth mode inquiry of work practices, we can get closer to work and the work practice, and uncover valuable insights which cannot be acquired by other means of inquiry.

Another appealing thing with the ethnographic work done in the area of CSCW is that it is goal oriented, as this follows the definition of CSCW itself:

> "*CSCW should be conceived of as an endeavor to understand the nature and requirements of cooperative work with the objective of designing computer-based technologies for cooperative work arrangements.* The fact that multiple individuals, situated in different work settings and situations, with different responsibilities, perspectives and propensities, interact and are mutually dependent in the conduct of their work has important implications for the design of computer systems intended to support them in this effort"
> (Bannon, Schmidt 1989, p. 5, original emphasis).

Thus, research undertaken from this stance should aim at being 'design relevant' and be oriented towards 'design interests' (Randall, Harper et al. 2007). Ideologically, the aim is to match man and machine in the situation of work, which is done in recognition that "…computers are enmeshed into a system of working instruments incorporated in highly particular ways (used, misused, modified, circumvented, rejected) into the flow of work" (Randall, Harper et al. 2007, p. 3). There is no basic agreement as to how ethnography is to be undertaken and how findings from ethnography are to be oriented towards design, but the act of data generation itself can be regarded as being mundane; it is the analytical skills that are demanding – the interpretation of data:

> "The important skills are mobilized back in the office (although not only there). They are analytic skills and are predicated on a sensibility or way of looking"
> (Randall, Harper et al. 2007, p. 18).

The research I undertook was especially inspired by previous studies of Orlikowsky (Orlikowski 1992) and Bansler and Havn (Bansler, Havn 2002). Each of these studies addressed office workers that are expected to engage in knowledge sharing behavior while situated in large corporations. The object was to create accounts of the situation that workers are in when expected to share, develop and maintain knowledge using technology. Inspired by those studies, I sought to investigate the KMS and the work context of it at Danfoss by getting as close as possible to the actual work practice surrounding that system, to sub merge into the culture and to attempt to understand the logic of the actors at Danfoss. I did so with the hope to both uncover problems and possibly to find a remedy for some of those problems, hopeful that persuasive design might play a role.

# 10. PAPERS PRODUCED

Structure: *This chapter presents the papers produced to answer the research questions posed.*

Essence: *A total of five papers were produced. Each paper is presented, and then it is explained how the paper serves its specific part in answering the research questions posed.*

This section presents only a summary overview of the papers (found in Appendix 1-5), their purpose and the methods used in them. The rationale for making them is given, showing which research questions they addressed, and the methods employed to answer the questions:

RQ1: What characterizes the situation that Danfoss workers are in when they are to share knowledge in online environments?

RQ2: What is the current state-of-the-art in persuasive design?

RQ3: How can we employ persuasive design to motivate knowledge sharing- and creating behavior, when designing online environments?

Each question was answered by producing research papers. First, explorative fieldwork was undertaken at Danfoss (Papers 1 and 2, Appendix 1 and 2), next the state-of-the-art of Persuasive Design was addressed (Paper 3, Appendix 3), a rich ethnographic investigation was carried out (Paper 4, Appendix 4), and lastly, a persuasive design method was used to create prototypes that were then validated with users exploring if this design approach could mitigate some of the issues uncovered (Paper 5, Appendix 5). A summary of the findings made can be found in section 11.

| Paper | RQ | Type | Purpose | Outcome | Published |
|---|---|---|---|---|---|
| 1 | 1 | Primary | Explorative | Indication of problems | Persuasive |
| 2 | 1 | Primary | | | OLCK |
| 3 | 2 | Secondary | Literature review | Overview of persuasive design | Persuasive 2009 |
| 4 | 1 | Primary | In depth look at problems from the perspective of Practice Drivers | Deeper understanding of workers situations and problems at Danfoss | In submission: Special issue on Knowledge Management in Action of the International Journal of Computer Supported Cooperative Work |
| 5 | 3 | Primary | Creating and testing persuasive prototypes | Users perception of created design | Possibly to be submitted for persuasive 2011 |

Table 1. Overview of papers produced

## 10.1 Paper 1 & 2 – RQ1: Explorative work

Papers 1 and 2 (Appendix 1 and 2) address research question 1: *"What characterizes the situation that Danfoss workers are in when they are to share knowledge in online environments?"* They were written based on the same empirical field data and they overlap significantly in content. Paper 1 (Appendix 1) was published at the Persuasive Conference (Torning 2008a). Based on feedback from peers, it was later developed into an extended version, that is, Paper 2 (Appendix 2) (Torning 2008b), which seeks to elaborate further on the data transformation process and to draw parallels between issues found at Danfoss and contemporary Web 2.0 Internet applications that have very active users contributing content.

### 10.1.1 Purpose

The work had two purposes. It was primarily undertaken to get acquainted with Danfoss as a corporation and to develop an initial understanding of the business and the situation that workers were in. The purpose was to investigate the feasibility of using Bitzer's communication model of the 'rhetorical situation' (Bitzer 1968, Vatz 1973) in order to analyze the macrosuasion level of a persuasive design (Fogg 2003). Fogg (2003) describes two levels of persuasion 'macro' and 'micro.' The term 'macrosuasion' describes the overall persuasive intent of a design. This is the top level behavior change that the design addresses, and which the design is to persuade. 'Microsuasion' can be a smaller feature in the form of interaction patterns that persuade. For instance, a web application to address personal finance might at the 'macrosuasion'-level be aimed to persuade the user into getting a better personal economy by taking a more structured approach towards spending. Such a web application can – on the 'microsuasion'-level employ various interactions to persuade that over all behavior change (e.g., by offering reminders to pay bills on time) alerts users when a budget is exceeded, helps users to set savings goals and track them, etc. Data was generated in regards to the 'macrosuasive'-level at Danfoss, and themes were then created by sorting the rich field data into the pre-made categories of Bitzer's model. This was done to analyze if workers were in a situation that *demanded* communication from them.

### 10.1.2 Method

I engaged in an open exploration of the workers in their environment at Danfoss to understand some of their culture and work. I generated data by qualitative methods, namely, by: observations, participant observations, structured and open interviews and by gathering artifacts. At this point an informed opinion (or bias) of Danfoss had not been formed. While I had some preconceptions about the generic nature of the corporate world, I sought to let the 'field' speak on its own terms. I mainly observed and engaged with workers at the central business department by being onsite and taking part in meetings. As such, the effort was not very focused. I spent 3 months at Danfoss, on and off; the entire time was, however,

not spent on research, I also had other obligations and sometimes worked on other things. Data was generated by fieldwork observations and interviews (Kvale 1996): First, in five loosely structured interviews (20 minutes duration) and in six structured interviews (1½ hours duration). Interviews, combined with observations and field notes, were then transformed into findings by sorting them using Bitzers' (Bitzer 1968) model as a framework for categorizing data to discover emergent structures (Saunders, Lewis et al. 2007). Thus, qualitative data was transformed into conclusions by sorting them into meaningful categories derived from an existing theoretical framework (Saunders, Lewis et al. 2007).

## 10.2 Paper 3 – RQ2: Literature review

Paper 3 (Appendix 3) addresses research questions 2: *"What is the current state-of-the-art in Persuasive Design?"* This was secondary research done to explore the persuasive design approach and to uncover what it could offer in regards to the issues uncovered at Danfoss. The effort was undertaken as a structured literature review in collaboration with Professor Harri Oinas-Kukkunen,[7] whom I had the good fortune to meet both at the Persuasive conference in 2007, but more intensively as a visiting scholar at Stanford H-STAR[8] where we both visited the Persuasive Technology Lab in 2008. The results were published for the Persuasive Conference in 2009 (Torning, Oinas-Kukkonen 2009)[9].

### 10.2.1 Purpose

The aim was to determine what state-of-the-art of persuasive design was in. With persuasive design being a new research area that is just emerging, it was sought to investigate what characterized the scientific research on the topic and to draw lines to possible future directions that the research might take. My underlying intention was to see what the approach would have to offer in regards to the KMS-issues at Danfoss. As seen from Paper 1 and 2 (Appendix 1 and 2) findings (Section 11.2.1), both negative and positive issues were uncovered, which might be addressed with design.

### 10.2.2 Method

A traditional literature review typically requires an iterative process (Bryman 2008, Saunders, Lewis et al. 2007) where keywords are sought out as themes and then iteratively researched, for instance, in article databases such as the social citation index. However,

[7] http://www.tol.oulu.fi/users/harri.oinas-kukkonen/
[8] http://hstar.stanford.edu/ I was at the Persuasive Technology Lab
[9] My contribution ratio was 75% see Appendix 3 "Author statement".

especially when dealing with an emerging multidisciplinary field of research, it can be difficult to determine what to include and what to omit in such a review. In reality, scientific work on persuasive design is almost limited to the International Conference on "Persuasive Technology", which is the main publishing channel for peer-reviewed work. For that reason, we chose to review the first three years of full papers for the Persuasive Technology conference series (N=51) (Oinas-Kukkonen, Hasle et al. 2008, de Kort, IJsselsteijn et al. 2007, IJsselsteijn, de Kort et al. 2006) as this seemed to be the best way to capture knowledge on the extant work. All full papers were carefully reviewed and schematized, employing a premade framework for analyzing Persuasive Systems Design Model (PSD-Model) (Oinas-Kukkonen, Harjumaa 2009).

## 10.3 Paper 4 – RQ1: In-depth fieldwork

After completing the exploratory field study and a literature review of persuasive design, I returned to research question 1: *"What characterizes the situation that Danfoss workers are in when they are to share knowledge in online environments?"* This time, however, the question was treated in far more depth and clearly oriented towards persuasive design. Paper 4 (Appendix 4), has been submitted to the International Journal of Computer Supported Cooperative Work, for a special issue on knowledge management in action.

### 10.3.1 Purpose

The purpose was to get closer to the culture and work at Danfoss, especially investigating deeper the problems in system usage. This time I entered the field with broader knowledge of persuasive design, as well as with a better understanding not only of what Danfoss was seeking to accomplish from its workers, but also of the technology that workers were offered. Effort was made to orient towards informing a persuasive design solution by generating data about what prevented the behavior from occurring, regardless of whether or not a system was available to workers. The focus was thus to uncover problems.

### 10.3.2 Method

Traditionally, an interdisciplinary approach can be found in ethnographic work (Randall, Harper et al. 2007). Such an interdisciplinary stance by nature pragmatically employ the methods that make the most sense in the context being investigated, without considering any entrenched disciplinary positions (Randall, Harper et al. 2007). For Paper 4 (Appendix 4), data was generated employing both qualitative and quantitative methods to shed light on the existing system at Danfoss. This was done using structured and unstructured interviews, observations, participant observations, workshops, artifact collection and reviewing archival records. Work participation was also employed as a way to get the insiders' view of the

work at Danfoss (Harper 2000). Quantitative data was generated by a web based survey (Appendix 6) administered to 256 subjects in the DBS sales program (181 replied, response rate 70.7%); this data was later used to triangulate fieldwork findings (Creswell 2003).

As a separate effort, the last four months of my time at Danfoss I did a single case study as described by Yin (Yin 2009, Yin 2003). The study did not have any explicit propositions, but sought to develop a deeper, more focused and structured understanding of RQ1, while also addressing RQ3, with the aim of informing a persuasive design stance that might be employed in resolving the issues uncovered. The study focused on investigating the local workers at Danfoss that had the role of securing the adoption of "best practices" locally. They were the workers that had to bridge the gap between local and central views while actively diffusing the "best practices" into Danfoss.

The analysis of the data was focused on the workers situation in order to provide an in-depth analysis of the logic of the work practice in question (Schmidt 2009). Findings were thus made by analyzing the data and writing an account of the situation of workers at Danfoss. Employing Yin's approach towards 'fact building' and "converging of evidence" (Yin 2009).

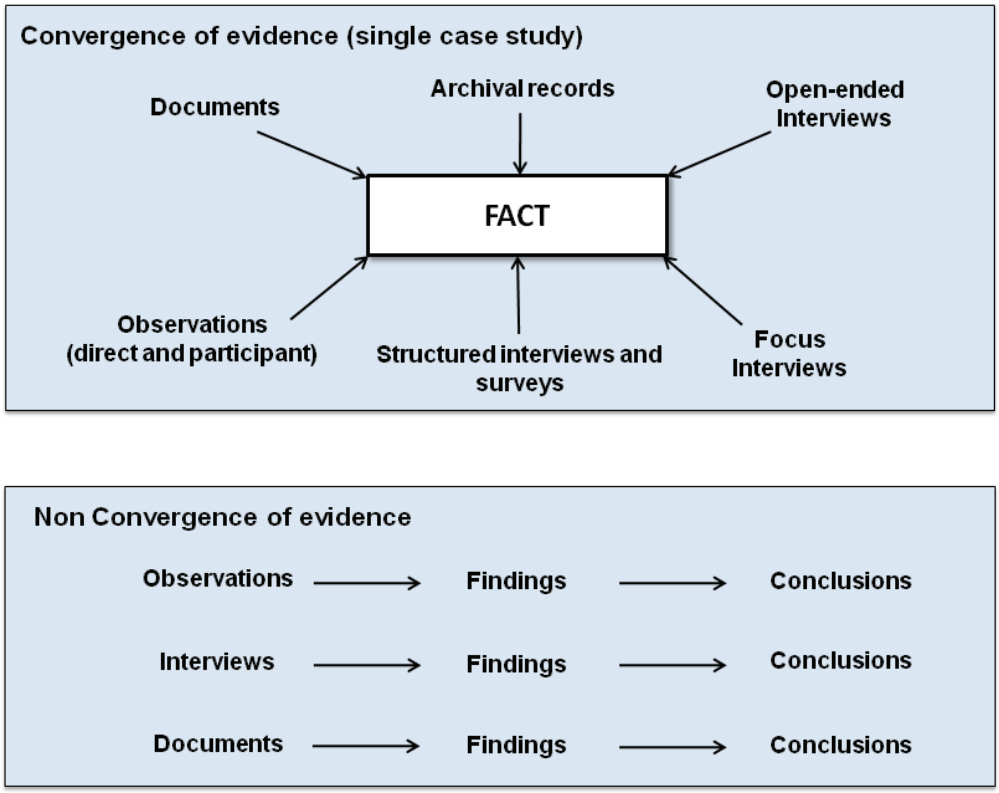



Figure 12: Yin's approach towards converging of evidence after Yin 2009, p. 117.

## 10.4 Paper 5 – RQ3: Prototype testing

Upon my arrival at research question 3: "*How can we employ persuasive design to motivate knowledge sharing- and creating behavior, when designing online environments?"* the PhD-project was in crisis, and the short answer would appear to be: "You can't"… Findings from both RQ1 (Section 11.2) and RQ2 (Section 11.3) clearly indicated that persuasive design would not be the most suitable treatment for the many diverse and severe issues uncovered by fieldwork; at best it could possibly play a marginal role. First, the context that workers were in at Danfoss was (is), as seen from paper 4 (Appendix 4), hardly addressable by means of technology alone. Second, the maturity of persuasive design as an approach for generating solutions is not high. For instance, we lack empirically validated design cases to build on. This had been unclear to me when I began my PhD-research, it was not even clear to me after my study of the state-of-the-art; in fact, it was not obvious until I saw the severe problems and I began to think more *operational* of how I might conduct persuasive design. There was also the issue of application domain, as seen from the persuasive design examples, which have been provided earlier (section 6.4 and 8.2.3); such designs tend to address a smaller and more focused behavior change. By comparison, making workers share 'knowledge' in a competitive corporate environment is a much more complex and complicated task. B.J. Fogg, in referring to smoking cessation, point out, that one should avoid "The Mount Everest of behavior change" (Fogg 2009b). This certainly rings true, however my research had reached a point of no return and thus RQ3 was answered by creating persuasive designs informed by the ethnographic observations made.

### 10.4.1 Purpose

The purpose of the research was twofold. First, it was to see if persuasive designs could be created and echoed with users at Danfoss when tested, regardless of the many cultural issues uncovered. In that sense, it was a proof of concept. Second, the research became an academic effort in regards to testing the Persuasive Systems Model (Harjumaa, Segerstaahl et al. 2009), when using it for actually *conducting* persuasive design, and also highlighting some of the issues with persuasive design.

### 10.4.2 Method

The approach taken was that of prototype testing. Scenarios were generated, informed by the fieldwork findings. I created medium-fidelity prototypes (Arnowitz, Arent et al. 2007) in PowerPoint, depicting the scenarios, and prepared descriptions of the personas working to solve tasks in the prototype interface. This approach was selected, as it was impossible to create a system on running code, and the effort thus centered on "sketching the user experience" (Buxton 2007).

I chose the PSD-Model (Oinas-Kukkonen, Harjumaa 2009, Oinas-Kukkonen, Harjumaa 2008) for two main reasons. First, I had employed it for the literature review (Paper 3, Appendix 3) and it was convenient. Second, the PSD-Model is de facto the most extensive persuasive design model currently available to designers, as it offers more parameters and, to a larger degree, represents a step-by-step process than do competing models (Fogg 2003, Lockton, Harrison et al. 2009, Fogg 2006, Fogg 2009b, Fogg 2009a).

As the main design criterion became to promote *transparency* as the concerted message of the system, it was speculated that one feasible design approach towards the situation would be to employ persuasive strategies to clarify what the situation at Danfoss actually was (that contributions and updates did not occur often). For instance, if the person responsible for a "best practice" did not update it, that would be made very clear in the interface itself for all workers to see. If a worker, on the other hand, did make updates, that would also be very visible for anyone visiting the site. This level of transparency was novel in regards to the Danfoss SharePoint® system, where mistakes or lack of action were largely invisible.

Four subjects who worked locally in the role of having to locally drive the usage of "best practice" took part in a 6-hour validation workshop. Prototypes were presented in plenary using a projector, and the session was recorded. This formed the basis for an open discussion of the utility of the prototypes. The persuasive design concept was covertly tested, however, it was mentioned that the main idea behind the prototypes was to actively invoke more knowledge sharing behavior.

| **Dimension P** | **rinciple** | **Implementation** |
|---|---|---|
| Primary task | Self monitoring | Tracking of goal completion and clearly flagging low performance. |
| Primary task | Tunneling | Visualizing, who "has the ball" and responsibility for taking action. |
| Primary task | Personalization | Allowing users to subscribe to their preferred content updates by email. |
| Dialogue support | Praise | System offers explicit praise when users engage in target behavior. |
| Dialogue support | Reminders | System sends email reminders to the person to act next. |
| System credibility | Authority | Official and formal language used to boost the credibility of processes. |
| Social support | Social comparison | Making it easy to compare who is engaging and who is not. Contributions are visible. Allow commenting and rating |
| Social support | Normative influence | Making the user feel the norm of Alpha Corp. "Here we update". |

Table 2. PSD-Model Principles employed to promote the main message of transparency.

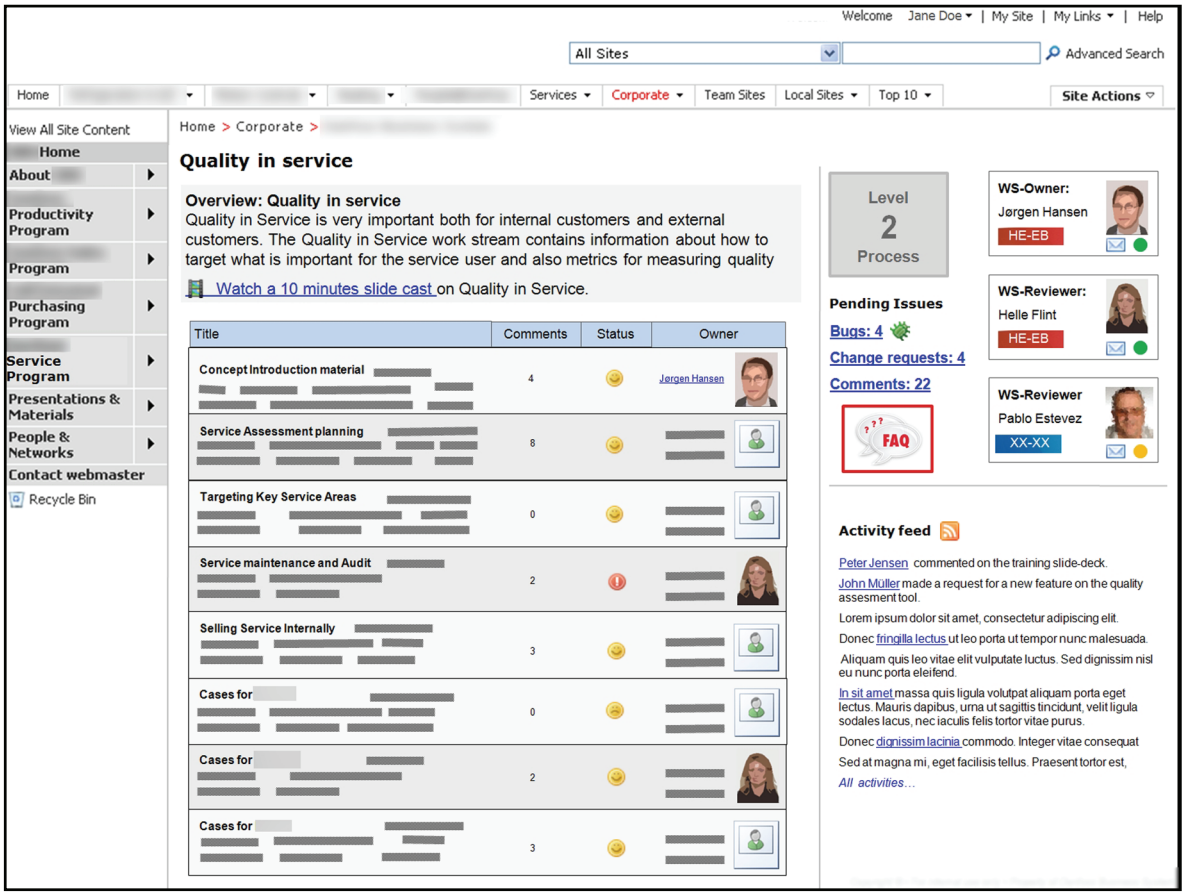



Figure 13: Example of a prototype interface

# 11. SUMMARY OF FINDINGS

Structure: *This chapter presents a summary of findings made.*

Essence: *The findings uncovered in answering each research question are presented. Addressing RQ1 uncovered many issues that serve to offer rational explanations as to why workers did not exhibit sharing behavior. Some were individual and tied to cognitive limitations, whereas others were due to organizational issues that affected sharing behavior negatively. Addressing RQ2 revealed persuasive design as a conceptual research area still in its infancy. The findings from RQ1 and RQ2 would, in turn, reveal that persuasive design is not the proper approach to address the many individual as well as organizational issues uncovered at Danfoss. Regardless, an effort was made to address RQ3, which, in turn, validated some RQ1 and RQ2 findings.*

## 11.1 Preamble

In this section, a summary overview of the papers and the findings made are presented; full details of the research can be found in the papers in Appendices 1-5.

## 11.2 Summary of RQ 1 findings

RQ1: What characterizes the situation that Danfoss workers are in when they are to share knowledge in online environments?

RQ1 was addressed two times, first in papers 1 and 2 (Appendix 1 and 2) and later in paper 4 (Appendix 4). Accordingly, findings are presented in that order.

### 11.2.1 Papers 1 & 2

In papers 1 and 2 (Appendix 1 and 2), a dichotomy was found between the workers on one side, and managers on the other. This emerged as field work data was analyzed employing Bitzer's theory of the rhetorical situation (Bitzer 1968) as a lens of analysis. Workers and managers were found to be in two very different rhetorical situations. Thus, a misalignment

was uncovered in regards to the situation that the different actors were addressing. Notably, the workers were not in a situation that demanded a response; in other words, plenty of sound reasons emerged that would explain why they did not find communicating in the Danfoss KMS 'exigent' (Bitzer 1968). From a design perspective, this was interesting, as the system would somehow have to persuade workers into communicating more.

| | Management | Workers |
|---|---|---|
| Exigence(s)<br>*The reason why actors communicate* | • Workers must share knowledge in a self sustainable way to ensure profitability.<br>• Uniform business processes, continuous learning and improvement are the way to ensure growth and profitability. | • Solving issues currently most important to me, to my nearest manager, and my business unit.<br>• Daily operations.<br>• Getting things to work. |
| Audience | • Workers at Danfoss | • Nearest manager & Colleagues |
| Constraints (Positive)<br>*Things that positively affects actors to communi-cate* | • Workers understand that the bench mark group is doing better and change is needed.<br>• Many employees would like a more uniform set of processes and clearer communication. | • Passion and willingness to work with business processes.<br>• Genuine interest in improving.<br>• Employees are interested in being autonomous and not having to deal with several management layers in order to change modes of work. |
| Constraints (Negative)<br>*Things that negatively affects actors to communi-cate* | • Primarily all the constraints of their audience the workers.<br>• Management is under the influence of multiple exigencies. Many things are exigent at the same time; a KMS is just one of them.<br>• Management is not tech savvy<br>• Management is leading people with more domain knowledge than themselves.<br>• Identity issues:<br>  ○ Identity might be partly upset by new free and open technologies.<br>  ○ Might not always be genuinely interested in free flow of all information in all situations.<br>  ○ Unease at what unleashing new tech such as blogs and wikis might bring in terms of free communication. | • Lack of time – or even time famine.<br>• Sharing knowledge is yet another meta-thing to do. Innovating and maintaining business processes is only a part time task. Extra work – but no clear "what's in it for me"-aspect.<br>• Working online has very low visibility.<br>• Lack of clear incentives.<br>• Lack of experience with online community software.<br>• Task is presented as very important, but this is not clearly reflected in everyday work.<br>• The culture of, i.e., sales peoples is not dominated by altruism and openness. Even in real life it is hard to obtain the "tricks of the trade".<br>• The current system has a somewhat weak ethos, and not all employees find it fun or giving to use it. |

Table 3. The two rhetorical situations uncovered at Danfoss

The issues uncovered did not create a rhetorical situation that would invite more sharing behavior. If one should summarize the findings in one quote from a subject, it could be:

> "If you are very happy in your first life, why would you go into second life?"[10]

Referring to the fact that if you have a competitive mind-set and you are a high-performer in real life, the question remains as to why you would spend time on working in a virtual KMS, if it did not give some level of manager attention. The quote resonates very well with a passage by Ackerman et al:

> "For experts, the cost of sharing expertise in a competitive environment generally outweighs the benefit of sharing. Why would I voluntarily help a competitor – for raises, for promotions, for status – in a system that induces more competitive dynamics? The answer is, I would not."
> (Ackerman, Wulf et al. 2002, p. 12)

Despite these somewhat harsh initial findings, opportunities were also uncovered. On the side of management, they included that the employees understood that the Danfoss' peer group were doing better and that change was needed. Another opportunity was that many employees actually liked the idea of a uniform set of processes and clearer communication in regards to their work. For the workers, it was found that they did have a passion and willingness to work with business processes grounded in a genuine interest in improving, but their current situation was constrained. In addition, it was found that workers, in general, were interested in being more autonomous (fitting the Danfoss strategy). The negative constraints found were mostly things that the management at Danfoss could address if they wanted to, for instance, changing the economy of sharing and the issue of workers needing more time and needing the work to be respected more as a real work task. It was possible to address the 'macrosuasion'-level using Bitzer as a framework, and the initial findings were that the workers were not in a situation that demanded communication from them – there were many good reasons that they did not communicate.

[10] Second Life® is an online 3-D virtual world created by its users: www.secondlife.com, at the time of the study it had received a lot of media attention as the "next big thing".


Figure 14:
Various overview materials used at production site.


Figure 15:
Close-up of a temporary weekly planner from production.


Figure 16:
Whiteboard from the production shop floor.

Many different types of white boards are employed for keeping an overview.

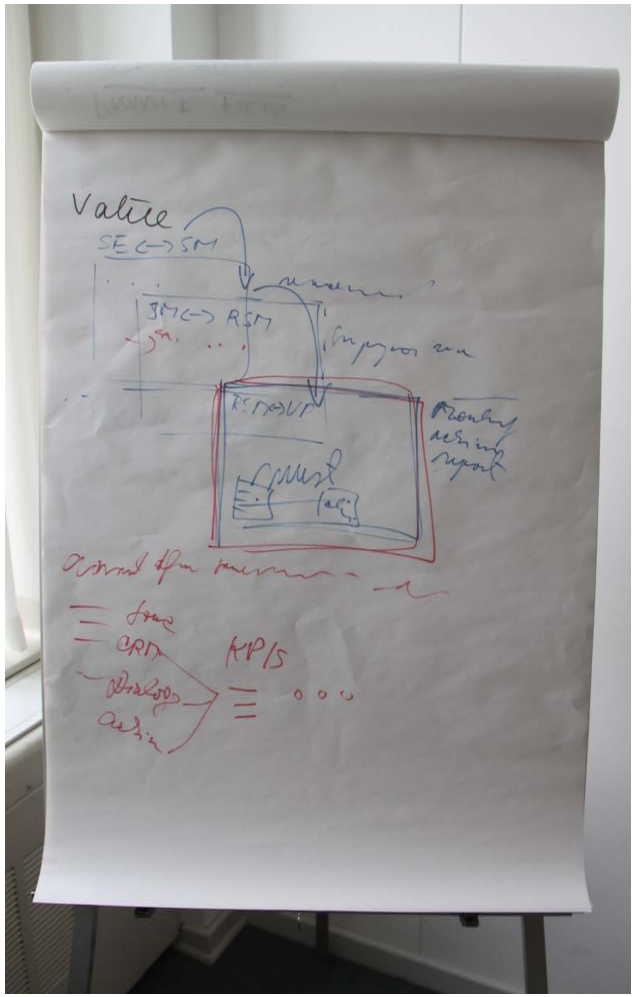
This example addresses a single team and its output.


Figure 17:
This is the set up for the shop floor manager.

Here prints are made and mounted on the whiteboard to provide an overview of the current state.


Figure 18:
Red cards used to give orders special priority.


Figure 19:
A projector ensures that workers can see the messages and information from management.



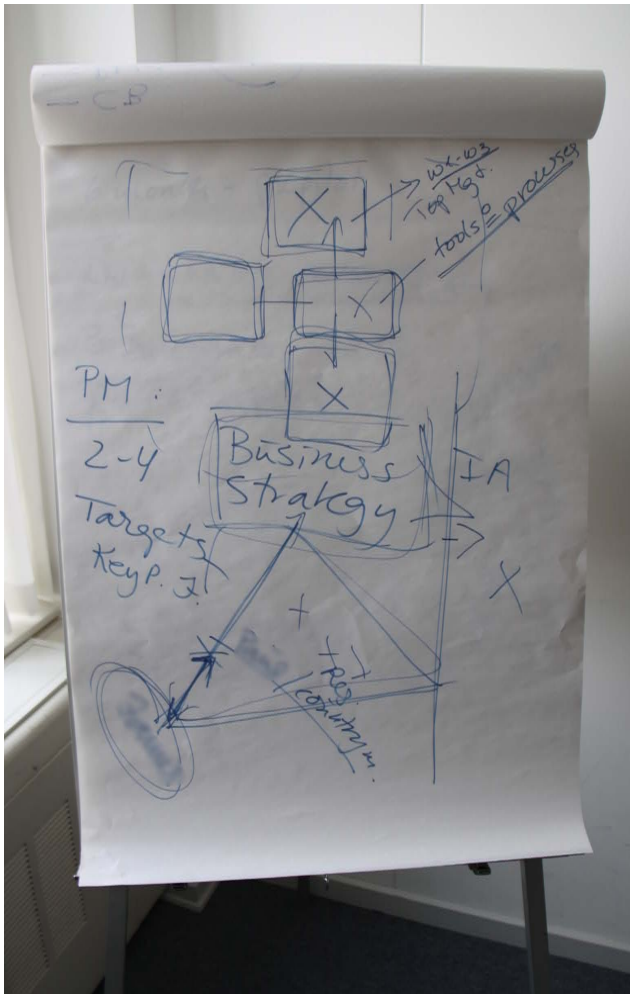




Figure 20:
Meeting “left overs” at DBS.

Drawing is extensively used to visualize relations between business units, strategy, planning, etc.

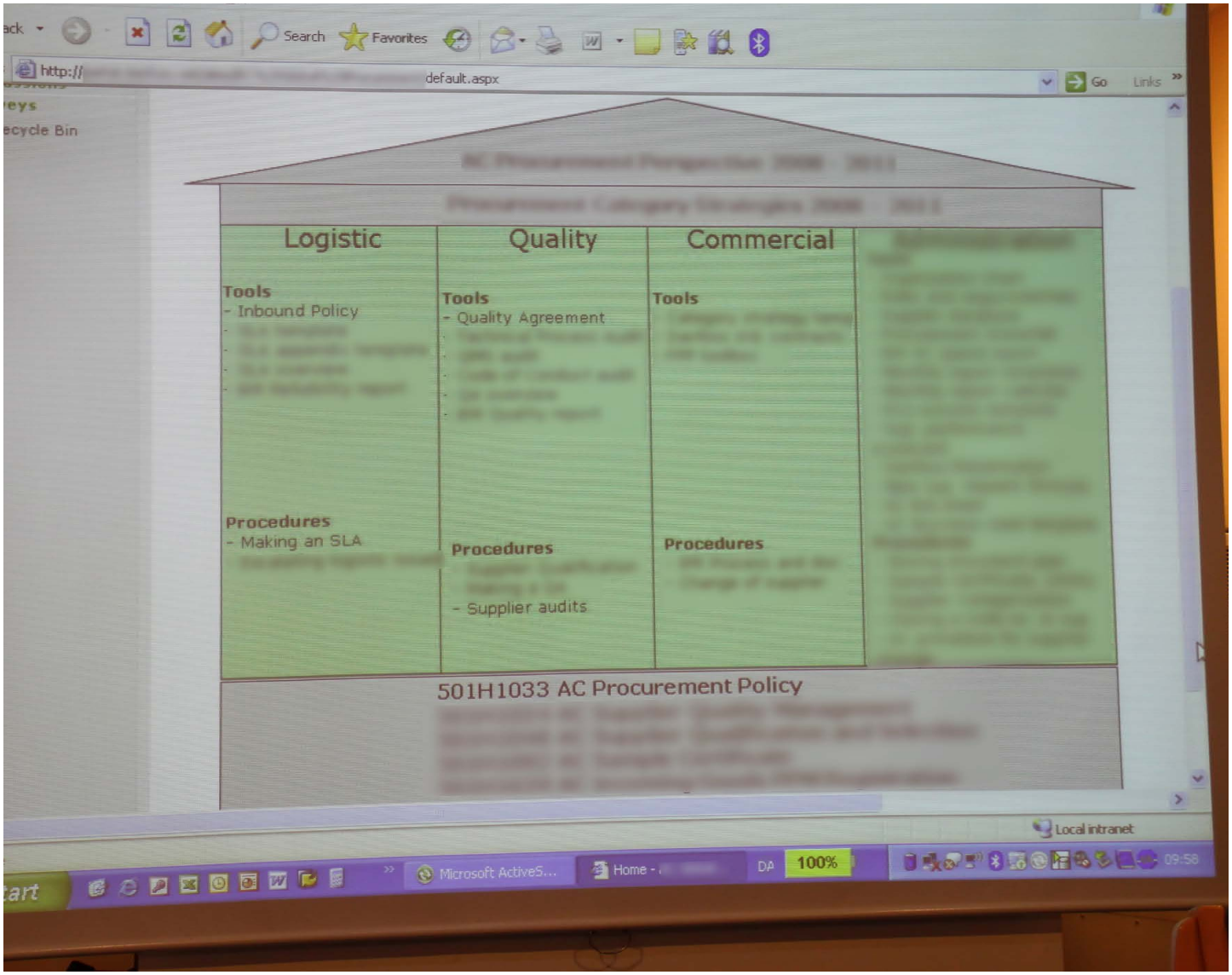



Figure 21:
Example of a local PRG

PRG sites contain 50-60 links to different types of office document content.

One such link is to the official “best practice” repository (DBS PRG).

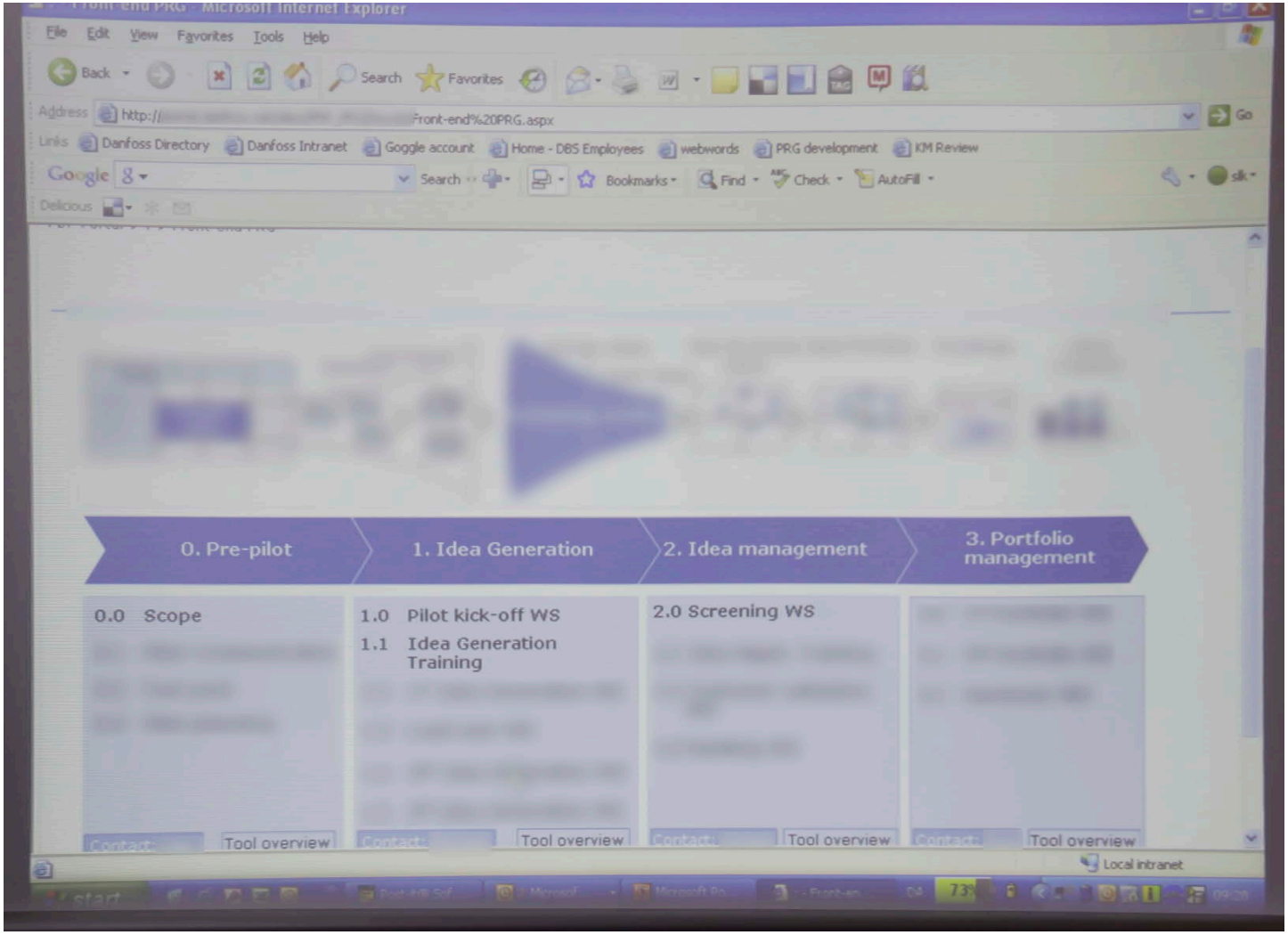



Figure 22:
Example of a DBS PRG

This sites contain a phase based process for working with innovation.

Each phase is comprised of several sub-processes that in turn contain several steps to complete.

There is no link from the DBS PRG's to the local BU PRG's.

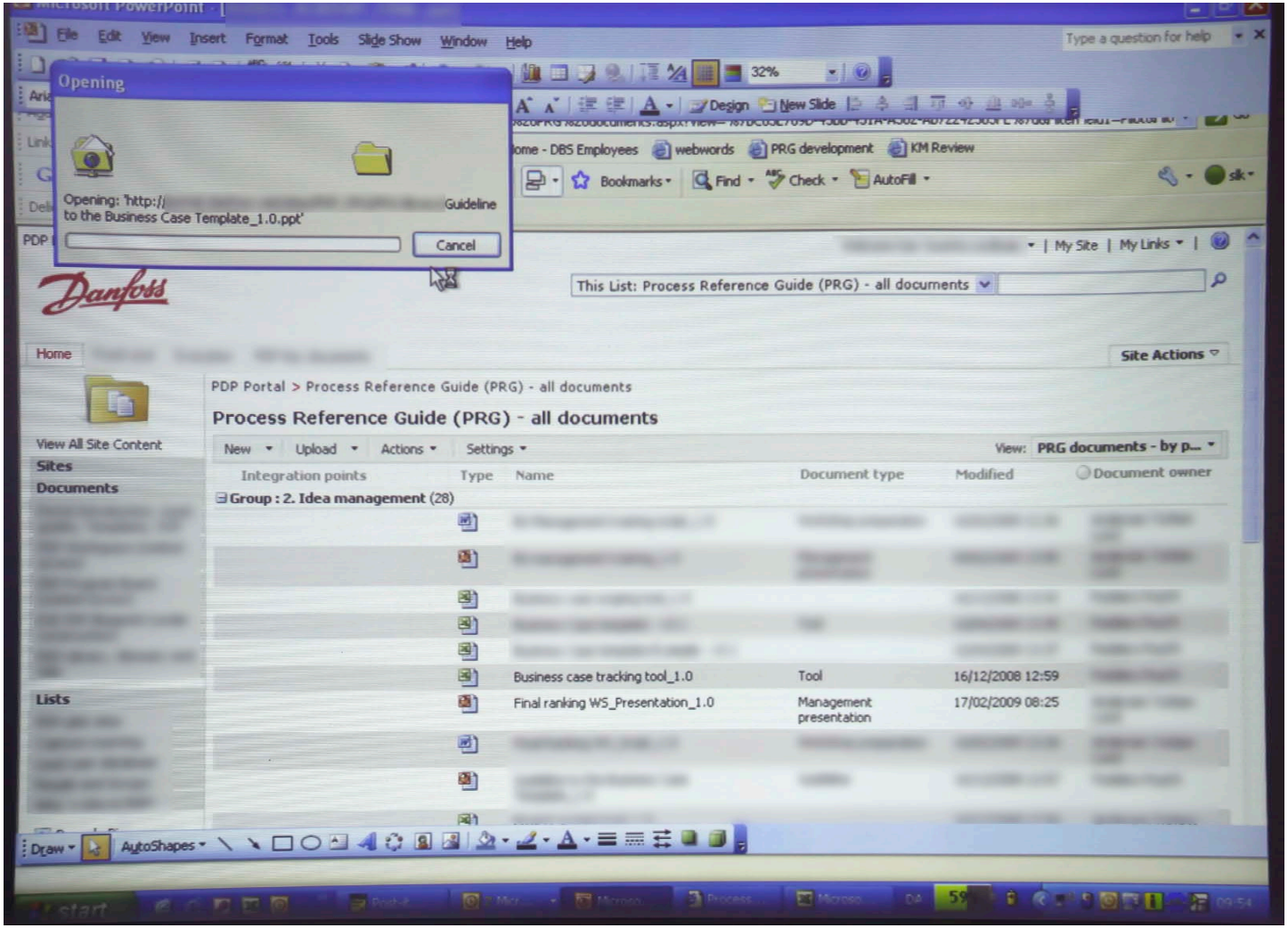



Figure 23:
Example of user experience when opening a document from the SharePoint server.

The document has been opened from the browser window “PRG”.

The box shows the file beginning to download, while the computer has begun, but not finalized, rendering the PowerPoint application at the top of the screen.

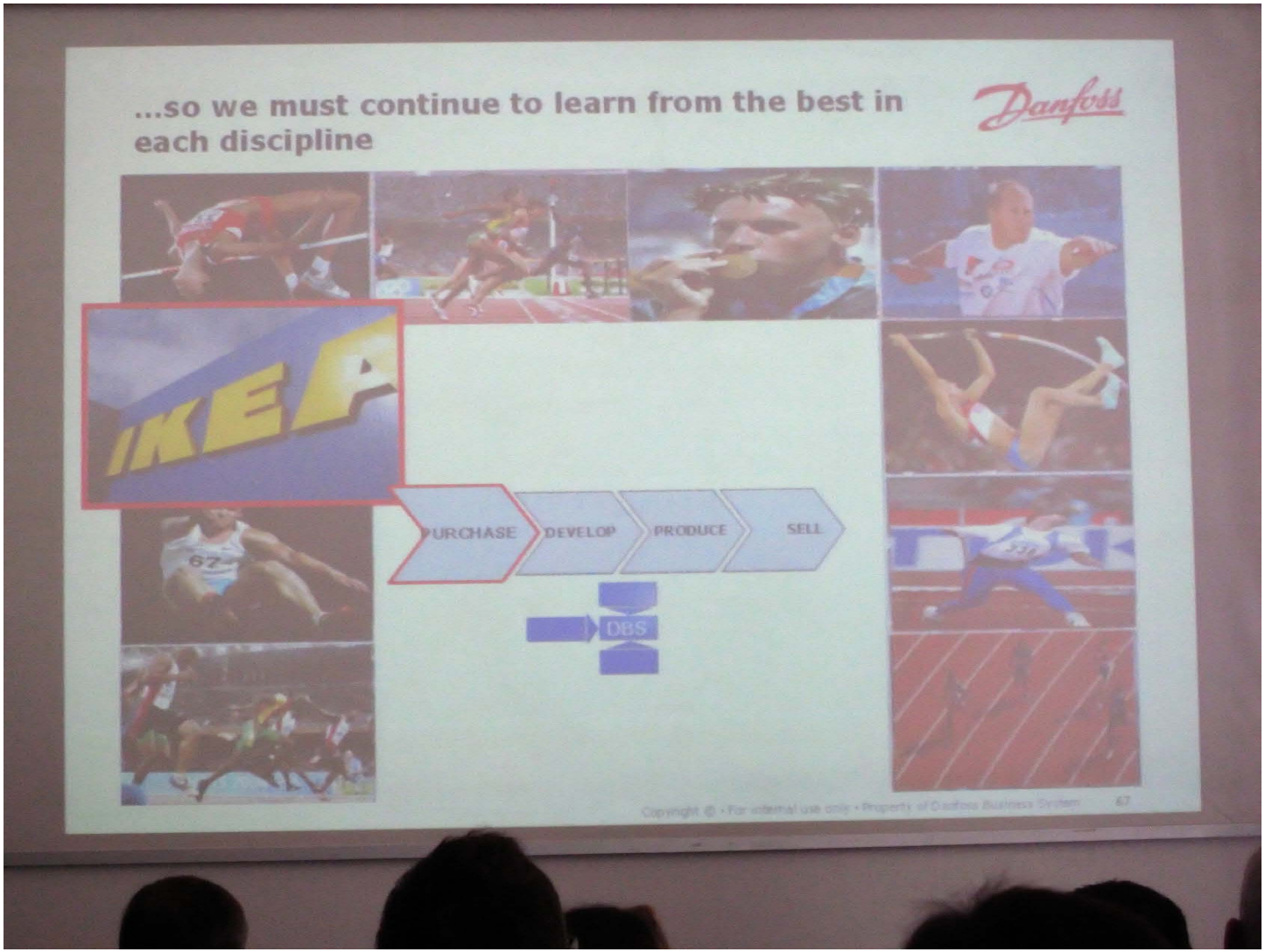



Figure 24:
Example slide from DBS quarterly meeting.

The concept is to be inspired by the best of each discipline.

Here IKEA is shown as a company that excels in the area of purchase by consistently attaining cheap prices on raw materials and labour.

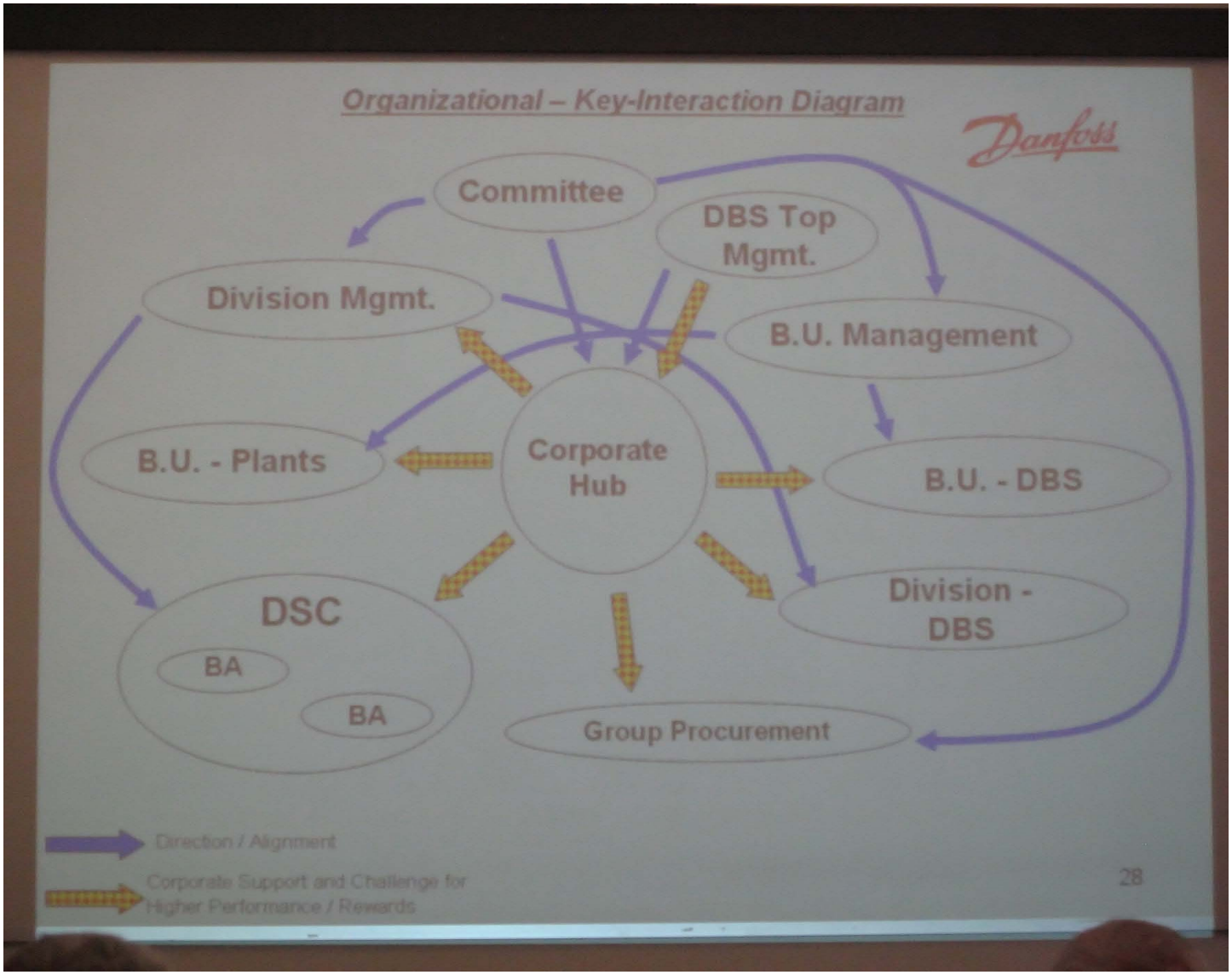



Figure 25: "Organizational - Key-Interaction Diagram"

A DBS quarterly work groups attempt to map the interactions in a work in progress future state of the complex Danfoss organization.


Figure 26:
Example output of a 3M workshop session on “quality” at a DBS Quarterly meeting.

On such occasions many groups work on many different topics producing ideas and presenting them to other groups.


Figure 27:
A joke posted by an unknown employee at the Global Headquarters as a response to the improvement mind-set sough after by management.

### 11.2.2 Paper 4

RQ1 and the workers situation at Danfoss was addressed again in paper 4 (Appendix 4), and here the main findings of the study were that there were even more sound reasons for workers not taking part in knowledge sharing and development to the degree that management was hoping for. The situation uncovered was very complex[11]. Many very different problems were found to affect the workers that were to address knowledge sharing on the operational level negatively. The research uncovered many serious issues at play and each might on its own be a showstopper. While some of these issues were tied to IT, namely, "Computer literacy" and "IT development" (as seen below), it was clear that the cultural aspects of the situation, the context that was to motivate contributions, had a much graver impact on the situation as a whole:

| **Problem** | **Components** |
|---|---|
| Informal process for changing practice | - Multi perspective (and ad hoc) workflow. The procedure is undocumented and dependent on the person spoken to.<br>- Practice Users cannot comment directly on "best practices," despite being the experts working with them daily.<br>- Informal handover process between often shifting Practice Owners results in clutter on the web pages and "best practices" being in a state of 'flux' and detached from local work practice. |
| Content complexity and quality | - Complexity of new "best practices" is higher than that in current daily operations, which results in local meta-documentation and branching of official "best practices."<br>- An abundance of complicated management terms in "best practices" descriptions deviates from actual work practice.<br>- Some users have problems with English as the corporate language.<br>- Local practitioners do not feel that generic Consult-Inc practices are good enough i.e., Process Drivers feeling embarrassed having to sell them to Process Users.<br>- Practice tools are, in fact, Excel-based software tools, but Process Owners are unfamiliar with the software development cycle, usability, change logs etc. |
| Computer literacy | - Users are not advanced Internet users and therefore unfamiliar with a web portal based workflow and are not offered training in it.<br>- General poor computer manners e.g., linking to very large files or downloading all content to a local hard drive.<br>- Process Owners have unrealistic expectations in regards to software development and development speed.<br>- Management only has rudimentary understanding of software i.e., grossly understaffing the Portal system. |
| IT development | - Static approach to IT, where customizations are avoided to ensure stability and lower maintenance costs.<br>- Lack of CSCW ownership i.e., no clear owner of a malfunctioning intranet search engine. |
| Organizational complexity | - Multiple directions set by DBS- and local managers.<br>- Very complex organization i.e., having to align with 22 people to consolidate a decision.<br>- A culture of loyalty rather than one of performance. |
| Who's "best practice?" | - Issues with generic "best practices" purchased from an external vendor, i.e., out-of-domain examples used to explain concepts.<br>- Misalignment between DBS theoretical approach towards work "best practice" and the more practical local work practices. |

[11] I can only highlight it partly here; for a full description see paper 4, Appendix 4.

| | |
|---|---|
| | - Lack of clear Danfoss cases of success with "best practices." |
| No incentives | - No monetary incentives offered for "best practice" improvement.<br>- No clear "What's in it for me" proposal made to "the people that have to do the typing." |

Table 4. Problems inhibiting knowledge sharing and further development of "best practices"

For instance, some users were both inhibited by cognitive limitations in regards to language *and* IT, as they spoke poor English and were not very used to work producing content on the Internet. Such capability issues alone can keep workers from using any "best practices" and make it unlikely that they will offer continuous improvement suggestions. At the same time, such users were not offered any training in using the SharePoint® system that was to be the foundation of the effort to work with knowledge. Another serious issue that surfaced was that incentives were not offered for taking part in this additional and hard extra work. Additionally, some workers could experience multiple directions being set. They might have to endure that their local manager who was paying their salary did not find work with "best practices" to be very important; however, central resources were pushing them to change the mode of work. More importantly, some workers found the "best practices" to be both overly complex and of low quality, as they did not meet local needs in full. This was probably a result of purchasing generic "best practices" from a consultancy firm (see section 5.3) and due to the complex matrix organization at Danfoss, where large domain differences would surface in regards to daily operations. IT wise, an interesting finding was that SharePoint® was run "out-of-the-box" and that the IT-Department, for good reasons, preferred to keep it that way. In essence, IT disregarded the user centered design paradigm that receives much praise in academic literature. Danfoss IT primarily worked to limit maintenance costs, not to customize the system for users and their context; an assignment they had been given by top management was to: Keep the seating cost low. This was especially grave, since SharePoint® is as much a development platform as a finished solution. While SharePoint® offers – again 'generic' – functionality, it is indeed 'generic' and as such does not offer a tailor made user experience for users, nor does it fit more advanced needs. This also led to the Intranet search engine not working, as it was left unconfigured since no one had ownership of it, or wanted to pay for a search-project. Noteworthy here was the fact that DBS had only hired one full time DBS employee to attend to, short of plain technical support, all the user needs in regards to using this system, which was to facilitate work with DBS knowledge globally.

## 11.3 Summary of RQ 2 findings

RQ2: What is the current state-of-the-art in persuasive design?

RQ2 was addressed in paper 3 (Appendix 3) by reviewing the first three years of full papers for the Persuasive Technology conference series (N=51) and analyzing each with the Persuasive Systems Design-Model (Oinas-Kukkonen, Harjumaa 2009). The state-of-art- in

persuasive design reveals itself as a rather new and still conceptual area of research. The papers evaluated in the literature review thus presented themselves as a less coherent body of work. Large individual differences were uncovered in the dissemination work that was reviewed. The domains addressed were also quite diverse, spanning applications designed to make children more interested in reading, to watching sports applications that motivate runners, to games that seek to persuade smoking cessation with a young target audience, to an interactive potted plant seeking to comfort lonely elderly people, while others again address motivating messaging in social software. Briefly stated, the papers describe a very wide array of scenarios, where behavior is changed or affected by technology on very different levels, and thus sometimes it is difficult to make comparisons. Many researchers employ approaches that we would expect to see in HCI research, e.g., within subject studies measuring two conditions.

Many research papers describe the investigated persuasive designs in a relatively vague manner, leaving room for improvement. Issues included that designs are described as being persuasive, but it is not entirely clear who is persuading whom and of what. For instance, only 28.1% (n=9) of the reviewed 32 experimental papers clearly stated the persuader, so that it was possible to extract "who was speaking." Most experimental papers 81.3% (n=26) were clear on the target behavior that they were aiming at invoking. However, a peculiar finding was that three of the experimental papers stated the change that they were aiming at in a clear manner, but did not state if it actually took place… In a similar manner, in 51.0% (n=26) of the papers it was not possible to determine the user context in a clear manner; however, scholars agree that persuasion is bound to the context in which it is to take place. Only 12 papers (23.5%) addressed the level of actual users and their individual context. The most popular persuasive strategies employed (as categorized after the Persuasive Systems Design-Model (Oinas-Kukkonen, Harjumaa 2009)) were Tailoring (Primary task support), Social comparison (Social support dimension), Tunneling (Primary task support), Reduction (Primary task support) and Suggestion (Dialogue support). Ethical considerations were largely unaddressed in the papers, as only *three* of the 51 reviewed papers discussed the topic at length. It was especially surprising that none of the experimental papers addressed ethical considerations with any length of discussion. This is a severe shortcoming in the current state-of-art in the field. Ethics being largely unaddressed is itself unethical, given the nature of the tradition of persuasion.

## 11.4 Summary of RQ 3 findings

RQ3: How can we employ persuasive design to motivate knowledge sharing- and creating behavior, when designing online environments?

RQ3 was answered in paper 5 (Appendix 5), which would, in turn, yield two sets of findings. One set was in regards to the concrete system changes that were suggested in a workshop to Danfoss workers, who, in turn, aired their opinion of it. Another set of findings,

ultimately the main findings, regarded the experience of using the PSD-Model, and thus related to conducting persuasive design.

The workshop took the form of an open discussion, and users in general were keen on the prototype-system that they were presented with, one asking when it could be done. The main design criterion of 'transparency,' making evident that sharing and update behavior was not occurring and who was responsible, was welcomed. Ironically, the subjects did not welcome it as much for their own work. For instance, in discussing the suggestion of a content star rating system, that would allow users to give content low ratings, a subject humoristically remarked:

> "I'm thinking, the star rating – we should definitely have that on the corporate site and not on my site".

While the statement caused laughter, it also revealed, that openness was perhaps something to fear – what if workers just rated everything low? Or if content was subject to rating, would workers not think that it was unfinished "best practices"?

As expected, most of the conversation and feedback was not centered as much on technology or web portals, as it was on discussing strategy and general responsibilities. Time was mostly spent addressing cultural and organizational issues, such as: content quality, the general strategy approach, management's true will to make changes, etc., which would take up most time in discussions. The prototypes anchored that discussion, but every debate on a feature suggested would result in discussions of organizational and cultural issues (as uncovered in answering RQ1). In turn, more questions were found than answered about the process of developing "best practices" further. Questions such as: When is a practice done? And who is to say that it was done? surfaced, completely disregarding that the concept was that "best practices" were never "done."

One example of the confusion on the operational level was in regards to who was responsible for customizing the "best practice" tools that needed some level of refitting to meet local requirements:

> "The thing is it depends very much on what you have in there [in the local KMS]. If for example, you have this excel template, where you have locked the template, then these are the [fixed] fields you have to fill in and there is no adaptation or anything. Then, you have the responsibility to take all change requests seriously. But in many cases, you have files, documents, presentations et cetera, where you say OK, I know that this document is not applicable a 100%, in all different business areas, in all different places, where it should be used, but I'm actually not responsible for doing the adaptation in this area, I have one concept, and the guys entering this [the shift towards adopting official "best practice"] need to take it and adapt it to their needs. In my case for example, what we are keeping an asset library that is often saved [updated]. People going in there and they use the tools. I will get sales people from different business

areas and different countries with very many different needs, and if I have to change everything they ask for, it would be nonsense."

The subject was backed by the other workshop participants who also had issues with too many requests for change; however, these were not visible in the system, and the requests for additional work were not welcomed, as there were too many of them. The issues that surfaced were lack of alignment and the proper setting of expectations. Local workers expected more service than the workshop subjects, who all worked locally, in the role of having to drive the local adoption of "best practices", could deliver. The workshop participants were essentially debating that local workers themselves should undertake the extraneous tasks (Schmidt 1991), which the refitting of "best practice" artifacts was in regards to conducting, e.g., sales or purchase. Debates addressing the additional work burden associated with "best practices," for instance, making them fit to the local work context, was a returning issue during the workshop. Everybody was pressed for time, so who had to deal with the practical work of maintaining and refitting these coordination mechanisms (Schmidt, Simone 1996)? Since the "best practices" was one-size-fits-nobody, it was somewhat strange that it was still so unclear as to who was to assume the additional workload. Some harsh critiques of the content of a specific "best practices" surfaced at the end of the workshop after the recorder had been turned off, after subjects' could see that they were "off the record." This concluded the workshop and resulted in more open hearted discussion. For instance, one subject in speaking of a specific set of "best practice" processes quite bluntly stated: "It doesn't work at all. We have been trying for two years, it gives us a bad reputation." Several such stories and large concerns would surface during the end of the workshop.

In regards to applying the PSD-Model on a concrete design case (albeit only to design prototypes), several issues surfaced that will briefly be mentioned here. The model was indeed valuable when creating designs, especially since it is extensive. Employing the model as a designer, one is taken by the hand, and the model ensures that the most central aspects of persuasive ICT design are dealt with. However, several critical issues can also surface, as the model does not offer a prioritization of the many parameters that one may chose to address. It does not offer suggestions for when it might be more appropriate to address the "social dimension" or "dialogue support dimension," and it does not aid in selecting whether to use a few or many parameters from each of the four dimensions it offers. As there are 28 parameters (~ sub-strategies) that designers might choose to address, the lack of prioritizing mechanisms becomes clear when employing the model. More gravely, the model does not offer any guidance in regards to creating the persuasive message in itself. This again leads one to consider the critique of Johnson, that persuasive design does not fully take into account the many disciplines that it draws upon (Johnson 2004). In the model, the capability to create a persuasive message is taken for granted. It is simply assumed that the designer will be able to do so. In the prototypes I created, the message of 'transparency' was a result of common sense, my proximity to work and my experience as a designer, not a suggestion of the design model.

# 12. CONCLUSION

Structure: *This chapter presents the conclusion of the PhD findings, discuss them and describe their validity.*

Essence: *This chapter presents the conclusion of the PhD findings for each of the three research questions posed. Their implications are then discussed in regards to the CSCW definition of 'cooperation', KMS in practice and the persuasive design approach. Lastly, the validity of the findings is evaluated.*

The leading research question for this thesis was:

> How can Danfoss address the context of workers, by employing persuasive design when creating online environments to be deployed globally?

It was found that the situation that Danfoss workers were in did not invite contributions in the online environment. The root cause was, in essence, a myriad of problems where each was complex in its own merits. The problems presented themselves as sound reasons why workers would not prioritize knowledge sharing. The context they were in made it *reasonable* not to contribute. As a result the conceptual persuasive design approach could not resolve the situation uncovered.

RQ1: What characterizes the situation that Danfoss workers are in when they are to share knowledge in online environments?

One set of problems was uncovered was tied to the capabilities of the individual workers themselves; these included: The workers ability to use IT systems and work under at web paradigm, while not being offered any training in doing so. For managers, it was an issue that their perception of IT led to their gross underestimation of the level of resources needed to work strategically with knowledge sharing in a KMS. On the individual level, there were also issues with employing generic "best practices," since especially local workers did not understand complex management concepts and terms explained with out-of-domain examples that did not fit the language of everyday work. Lastly, there were cultural differences in regards to language, as some workers did not understand English very well and hence did not feel comfortable in writing it either. Notably each of these problems might alone prevent the true adoption of a KMS.

A different set of problems was uncovered that was related to the organizational level of Danfoss which also prevented a higher degree of knowledge sharing from taking place. The

process for changing "best practice" was found to be informal and person dependent, as no two persons shared a uniform view of how it was to take place. The complexity of Danfoss as an organization would also surface as a grave problem, as local workers could experience multiple directions set by DBS management and local management, and thus sharing was not seen as being equally important by all parties involved. At the same time, there were issues concerning whose "best practice" it was. The "best practices" had initially been purchased from a consultancy, but despite refitting, they did not fully fit local needs, and it was unclear who was to carry the burden of the extraneous work of customizing them. The gravest issue in regards to having workers adopt "best practices" was the lack of clear Danfoss success cases, which could serve as proof that the practices were indeed beneficial for local departments. Organizationally, a problem was also uncovered in regards to IT being static, while the organization was organic and flexible. The IT department was designed for cost, and to a lesser degree, for users; as such, the KMS, were not customized for the exact use that it was intended to support; for instance, with the unusual result that the search engine did not work on the SharePoint® server. Lastly, no real incentives were offered.

RQ2: What is the current state-of-the-art in persuasive design?

The state-of-art of persuasive design was investigated, and this investigation revealed a young area of research that is just beginning to take shape. Many issues are lurking, while the core concept of seeking to change user behavior by deliberately constructing technology for that stated purpose is clear. Many issues echo the critique that Johnson (Johnson 2004)and Atkinson (Atkinson 2006) raised, such as: not addressing ethics in more nuance, anthropomorphizing machines and not addressing in full the many disciplines which must tie into a description of technology as a medium for persuasion (see more in section 0). These points remain unaddressed and one is left with the impression that the area is still conceptual. For instance, it is typically unclear how the persuasive designs we are presented with was created, and to what degree the change sought after was decided beforehand. Typically, designs were not created using persuasive design models, as these are in their infancy. As such, the field seems to be a sub-area of HCI, rather than a field in its own merits, mostly attracting researchers from Computer Science, rather than, for instance, product designers, architects; researchers from the wider area of communication are not represented at all. Dominantly, researchers are from Europe and USA.

RQ3: How can we employ persuasive design to motivate knowledge sharing- and creating behavior when designing online environments?

With the current level of complexity uncovered working with RQ1 and RQ2, it was found that persuasive design cannot play any large role in motivating knowledge sharing- and creating behavior at Danfoss. Too many issues would demand mitigation prior to making it feasible to address the level of designing online environments to be more persuasive. As such, persuasive design is not the proper stance towards resolving the many real life issues

uncovered. This was expected prior to addressing the situation with prototypes in an open workshop format; however, doing so anyway in turn validated many issues found in the field work, and it also provided experiences with actually designing using the PSD-Model.

## 12.1 Discussion and future research

In my opinion, research is a joint endeavor where researchers are part of a global community that undertakes work to create scientific knowledge, a worn term suggesting that we are dwarfs standing on the shoulders of giants. Three areas will be pointed out where researchers could find opportunities for further academic investigation.

### 12.1.1 'Cooperation' on knowledge sharing?

Upon analyzing my fieldwork, I am pessimistic in regards to using computer based technology for knowledge sharing and development at Danfoss. The fieldwork uncovered so many and grave issues that I must question my initial stance, which was addressing KMS from the perspective of CSCW (section 8.1 and 9.2). I think it would need to be questioned if the research revealed a situation of true cooperation. In CSCW, 'cooperation' is traditionally seen as multiple persons being bound together and *mutual dependent* (interdepended) on the cooperation, and this interdependency is taken literally: The activities of person 'A' should rely positively on the quality and timeliness of person 'B' and vice versa (Schmidt 1991). Cooperative work is constituted by this interdependence (Schmidt, Simone 1996), and thus an investigation of multiple individuals working separately on separate projects is not regarded as 'cooperation'. As seen from paper 1, 2 and especially 4 (Appendices 1, 3 and 4), there were different roles affected by many things, but viewing things from a bird's perspective, I must question if they were interdependent, and conclude that they were not. With the exception of production, where white boards were used rather than computers, the task of working with 'knowledge' was not mission-critical to anyone. No one could fail as a result of 'knowledge'-activities not taking place in SharePoint®. Thus, at the end of my PhD-Journey, I read Orlikowskis seminal Notes Study (Orlikowski 1992) in a different manner compared to the inspiration I felt when I began my project three years ago. Today, I think Orlikowski addressed a very interesting case, but not one where workers were interdependent on the work in the Notes System. I would therefore urge others venturing into the field to address the usage of portal systems, to duly take note if work is indeed 'cooperative'– it might be one of the first things to look out for.

### 12.1.2 "Stock" KMS in Practice…

An interesting aspect of the "stock" perspective on knowledge management (Huysman, Wit de 2002) is that it conceptually *sounds* very appealing. It has an Utopian storyline, as it

argues that managers can assume power over 'knowledge,' and that it can be addressed, as though it was almost a tangible object that could be moved around. If companies are only willing to spend the energy it takes, they can seemingly choose to employ knowledge management and complete such initiatives at will. Workers, it would seem, can share and create 'knowledge' in part supported by networked computers. Returning to the generic knowledge processes listed by Grover and Davenports (Grover, Davenport 2001) as common in much knowledge management literature, it almost seems like a simple three step rocket. Perhaps inadvertently, it is portrayed as a semi-trivial task: knowledge generation, knowledge codification and knowledge transfer – 'knowledge' can allegedly be generated, codified, put in a database and simply transferred from one individual to the next, who can simply download it. My research at Danfoss, however, leads me to raise some concerns about this "stock" view of 'knowledge' and the processes that surround it. I find it difficult to see where such sub-processes would come to their true right. Via my proximity to the work practice at Danfoss, a very complex situation was uncovered, and I wonder why some of these problems have not received more attention in the literature. Plenty of ideas are presented from the organizational management perspective, where a somewhat theoretical strategic advantage seemingly gets the most attention. I am left confused as to why issues are not treated in more detail from the perspective of the individual workers that have to engage in the processes. After venturing into the field, I am left asking: How do we *do* knowledge management? What is the low practical nature of it? For that purpose, I would argue that a body of cases describing the prolonged success of KMS in practice is needed. There is an acute shortage of prolonged ethnographic accounts uncovering more practical dimensions of working with knowledge under a modern web-paradigm. Since most modern KMS tend to web based applications, there is a genuine need to study such systems in the environment in which they are used by workers at a larger scale. Another issue to address might be to research, why expectations are set as they are – why do managers seemingly set their expectations towards software as high as they do? Why are many mistakes being reenacted? As companies purchase KMS and concepts for KMS hoping that they can somehow contribute to productivity and ultimately growth, plenty of users are affected by this type of software and the underlying assumptions that are embedded in them.

### 12.1.3 The Persuasive Design Approach

Clearly persuasive design was not the remedy for the situation uncovered at Danfoss. Regardless of any SharePoint® modifications or alternative system designs, it would not be possible to persuade workers at Danfoss into knowledge sharing by addressing them with a technology design alone. I find it too premature to speak of the persuasive design of organizations, and thus I will not. I would, however, argue that persuasive design holds great potential as a novel way to think about influencing behavior change. However, a key learning from the work done here is that researchers should perhaps focus on small behavior changes and select behaviors that users are already motivated towards doing. Better results can probably be reached, for instance, researching sports applications that motivate people

of a certain exercise behavior when running, notably targeting people that already are running, or aiming at persuading them into running in a certain manner at certain intervals. While persuasive design is still conceptual, I believe that it is a real research area which is different from other stances towards design (as argued in section: 8.2.2). This is true, especially if researchers in the area were to openly address the shortcomings pointed out by others (Atkinson 2006, Johnson 2004).

## 12.2 Validity

Validity can be regarded as the issue of whether an indicator (or a set of indications) devised to gauge a concept really measures that concept (Bryman 2008). For the work presented here, some points must be made. The bulk of research presented here was done as field work to investigate RQ1. This was done following a known tradition, and thus validity was in part ensured by employing the same methods that other researchers employed when addressing the same phenomena (section 9.2). For some results, convergent validity was attained by employing triangulation, where quantitative data and qualitative data would point towards the same issues. As for an overall assessment of the validity of the work, it should be noted that it was a relatively small-scale evaluation of KMS in a corporate context, and it suffers from exactly that. A novice researcher undertook work and both had to learn the craft of research while engaging actively in it. To bolster findings presented here, future research would need to engage in larger-scale investigations of this area, for instance, researching several companies and governmental institutions.

# 13. REFERENCES

*Below are the references used in this PhD-report, additional literature was used in the 5 papers produced (Appendix 1-5).*


ACKERMAN, M.S., WULF, V. and PIPEK, V., 2002. Sharing Expertise: Beyond Knowledge Management. 1 edn. Cambridge, MA, USA: MIT Press.

ALAVI, M. and LEIDNER, D.E., 2001. Review: Knowledge management and knowledge management systems: conceptual foundations and research issues. *MIS Quarterly,* 25(1), 107-136.

ALVESSON, M. and KARREMAN, D., 2001. Odd Couple: Making Sense of the Curious Concept of Knowledge Management. *Journal of Management Studies,* 38(7), 995-1018.

ARISTOTLE, 350 B.C.E, 2010-last update, Rhetoric [Homepage of classics.mit.edu], [Online]. Available: http://classics.mit.edu/Aristotle/rhetoric.html [28/5, 2010].

ARNOWITZ, J., ARENT, M. and BERGER, N., 2007. Effective Prototyping for Software Makers. 1'st edn. San Francisco: Morgan Kaufman.

ATKINSON, B., 2006. Captology: A Critical Review, W. IJSSELSTEIJN, Y. DE KORT, C. MIDDEN, B. EGGEN and E. VAN DEN HOVEN, eds. In: *Persuasive Technology - First International Conference on Persuasive Technology for Human Well-Being, PERSUASIVE 2006,* May 18-19 2006, pp171-182.

BANNON, L.J. and SCHMIDT, K., 1989. CSCW: Four Characters in Search of a Context, P. WILSON and P. BOWERS, eds. In: *Proceedings of the 1989 First European Conference on Computer Supported Cooperative Work,* 13-15 September 1989 1989, Computer Sciences Company pp3-16.

BANSLER, P., J and HAVN, C., E., 2002. Sharing Best Practices: An Empirical Study of IT -Support for Knowledge Sharing, S. SMITHSON, J. GRICAR, M. PODLOGAR and S. AVGERINOU, eds. In: *Proceedings of the Ninth European Conference on Information Systems,* 5-6 April 2002 2002, Moderna organizacjia, Bled, Slovenia. pp653-664.

BARDINI, T., 2000. Bootstrapping - Douglas Engelbart, Coevolution, and the Origins of Personal Computing. Stanford, California, USA: Stanford University Press.

BEYER, H. and HOLTZBLATT, K., 1998. Contextual Design - *defining Customer-Centered Systems*. San Francisco: Morgan Kaufmann Publishers.

BIJKER, W.E. and LAW, J., 1994. Shaping technology/Building Society : Studies in sociotechnical change. 2. ed 1994 edn. MIT Press.

BITZER, L., F., 1968. The Rhetorical Situation. Pennsylvania, USA: Pennsylvania State University Press.

BRYMAN, A., 2008. Social research methods. 3rd edn. United States: Oxford University Press.

BUXTON, B., 2007. Sketching User Experiences: Getting the Design Right and the Right Design. 1'st edn. San Francisco: Morgan Kaufmann.

CARD, S., MORAN, T. and NEWELL, A., 1983. The Psychology of Human-Computer Interaction. 1'st edn. Hillsdale, NJ: Lawrence Erlbaum Associates.

CHATTERJEE, S. and DEV, P., eds, 2009. *Persuasive Technology, Fourth International Conference, PERSUASIVE 2009, Claremont, California, USA, April 26-29, 2009. Proceedings.* USA: ACM.

CHI, P., CHEN, J., CHU, H. and LO, J., 2008. Enabling Calorie-Aware Cooking in a Smart Kitchen, H. OINAS-KUKKONEN, P. HASLE, M. HARJUMAA, K. SEGERSTÅHL and P. ØHRSTRØM, eds. In: *Persuasive Technology - Third International Conference, PERSUASIVE 2008,* June 4-6 2008, Springer - Proceedings Series: Lecture Notes in Computer Science pp116-127.

COAKES, E., 2004. Knowledge Management--a Primer. *Communications of AIS,* 2004(14), 406-489.

CRESWELL, J., W., 2003. Research Design - Qualitative. Quantitative, and Mixed Methods Approaches. Second edn. California: Sage Publications Inc.

CRESWELL, J., 2007. Qualitative Inquiry and Research Design: Choosing Among Five Approaches. Sage Pubn Inc.

DE KORT, Y., IJSSELSTEIJN, W., MIDDEN, C., EGGEN, B. and FOGG, B., 2007. Persuasive Technology - Second International Conference on Persuasive Technology, PERSUASIVE 2007, April 26-27, 2007 2007, Springer - Proceedings Series: Lecture Notes in Computer Science pp1-316.

DRUCKER, P.F., 2005. The Essential Drucker - The best of sixty Years of Peter Drucker's essential writings on management. New York: First Collins.

ENGELBART D., C., 1962-last update, Augmenting Human Intellect: A Conceptual Framework [Homepage of SRI International], [Online]. Available: http://www.dougengelbart.org/pubs/augment-3906.html [02/26, 2010].

ENGELBART, D. and LEHTMAN, H., 1988. Working together. *BYTE,* 13(13), 245-252.

FOGG, B.J., 2003. Persuasive Technology - using Computers to Change What We Think and Do. San Francisco: Morgan Kaufmann Publishers.

FOGG, B.J., 1998. Persuasive Computers: Perspectives and Research Directions. *CHI 98 Los Angeles USA - 18-23 April 1998,* , 225.

FOGG, B.J., 2006. The Six Most Powerful Persuasion Strategies, W. IJSSELSTEIJN, Y. DE KORT, C. MIDDEN, B. EGGEN and E. VAN DEN HOVEN, eds. In: *Persuasive Technology - First International Conference on Persuasive Technology for Human Well-Being, PERSUASIVE 2006,* May 18-19 2006, pp6-6.

FOGG, B., 2009a. A behavior model for persuasive design, *Persuasive '09: Proceedings of the 4th International Conference on Persuasive Technology,* 2009a, ACM pp1-7.

FOGG, B., 2009b. Creating persuasive technologies: an eight-step design process, *Persuasive '09: Proceedings of the 4th International Conference on Persuasive Technology,* 2009b, ACM pp1-6.

FOGG, B., 1999. Persuasive technologies. *Communications of the ACM,* 42(5), 26-29.

FOSS, S., K., FOSS, K., A. and TRAPP, R., 1985. Contemporary Perspectives on Rhetoric. Second Edition edn. Prospect Heights, Illinois: Waveland Press Inc.

GIBSON, J.J., 1986. The Ecological Approach To Visual Perception. New edition edn. New York, NY, USA: Psychology Press.

GRANT, R.M., 1996. TOWARD A KNOWLEDGE-BASED THEORY OF THE FIRM. *Strategic Management Journal,* 17, p109.

GROVER, V. and DAVENPORT, T.H., 2001. General Perspectives on Knowledge Management: Fostering a Research Agenda. *J.Manage.Inf.Syst.,* 18(1), 5-21.

GRUDIN, J., 1994. Groupware and Social Dynamics - Eight Challenges for Developers. *Communications of the ACM,* 37(1), 92-105.

HARJUMAA, M. and OINAS-KUKKONEN, H., 2007. Persuasion Theories and IT Design, Y. DE KORT, W. IJSSELSTEIJN, C. MIDDEN, B. EGGEN and B. FOGG, eds. In: *Persuasive Technology - Second International Conference on Persuasive Technology, PERSUASIVE 2007,* April 26-27 2007, pp311-314.

HARJUMAA, M., SEGERSTAAHL, K. and OINAS-KUKKONEN, H., 2009. Understanding persuasive software functionality in practice: a field trial of polar FT60, *Persuasive '09: Proceedings of the 4th International Conference on Persuasive Technology,* 2009, ACM pp1-9.

HARPER, R.R., HUGHES, J.A. and SHAPIRO, D.Z., 1989. Working in Harmony: An Examiation of Computer Technology in Air Traffic Control, P. WILSON and P. BOWERS, eds. In: *Proceedings of the 1989 First European Conference on Computer Supported Cooperative Work,* 13-15 September 1989 1989, Computer Sciences Company pp73-86.

HARPER, R.H.R., 2000. The Organisation in Ethnography --A Discussion of Ethnographic Fieldwork Programs in CSCW. *Computer Supported Cooperative Work,* 9(2), 239-264.

HEATH, C. and LUFF, P., 1991. Collaborative Activity and Technological Design: Task Coordination in London Underground Control Rooms, L.J. BANNON, M. ROBINSON and K. SCHMIDT, eds. In: *Proceedings of the Second European Conference on Computer Supported Cooperative Work, 24-27 September 1991, Amsterdam, The Netherlands,* 24-27 September 1991, Kluwer pp65-79.

HEVNER, A.R., MARCH, S.T., PARK, J. and RAM, S., 2004. Design Science in Information Systems Research. *MIS Quarterly,* 28(1), 75-105.

HINDS, P. and PFEFFER, J., 2002. Why organizations Don't "know What They Know": Cognitive and Motivational Factors Affecting the Transfer of Expertise. In: M.S. ACKERMAN, V. WULF and V. PIPEK, eds, *Sharing Expertise: Beyond Knowledge Management.* Cambridge, MA, USA: MIT Press, .

HOLTZBLATT, K., WENDELL, B., J. and WOOD, S., 2005. Rapid Contextual Design - *a How-To Guide to Key Techniques For User-Centered Design*. 1 edn. San Francisco: Morgan Kaufmann Publishers.

HUYSMAN, M. and WIT DE, D., 2002. A Critical Evaluation of Knowledge Mangement Practices. In: M.S. ACKERMAN, V. WULF and V. PIPEK, eds, *Sharing Expertise: Beyond Knowledge Management.* Cambridge, MA, USA: MIT Press, .

IJSSELSTEIJN, W., DE KORT, Y., MIDDEN, C., EGGEN, B. and VAN DEN HOVEN, E., 2006. First International Conference on Persuasive Technology for Human Well-Being, PERSUASIVE 2006, May 18-19, 2006 2006, Springer - Proceedings Series: Lecture Notes in Computer Science pp1-214.

JOHNSON, R.R., 2004. Book Reviews: Persuasive Technology: Using Computers to Change What We Think and Do. *Journal of Business and Technical Communication,* 18(2), 251-254.

KENSING, F. and BLOMBERG, J., 1998. Participatory Design: Issues and Concerns. *Computer Supported Cooperative Work (CSCW),* 7(3), 167-185.

KREINER, K., 2002. Tacit knowledge management: the role of artifacts. *Journal of Knowledge Management,* 6(2), 112-123.

KRUG, S., 2005. Don't Make Me Think: A Common Sense Approach to the Web. 2nd edn. Thousand Oaks, CA, USA: New Riders Publishing.

KVALE, S., 1996. InterViews: An introduction to qualitative research interviewing. Thousand Oaks - Sage.

LAW, J., 1991. A Sociology of monsters : essays on power, technology, and domination / edited by John Law. Routledge, London ; New York.

LOCKTON, D., HARRISON, D., HOLLEY, T. and STANTON, N.A., 2009. Influencing interaction: development of the design with intent method, *Persuasive '09: Proceedings of the 4th International Conference on Persuasive Technology,* 2009, ACM pp1-8.

LOCKTON, D., HARRISON, D. and STANTON, N., A., 2008. Design with Intent: Persuasive Technology in a Wider Context, H. OINAS-KUKKONEN, P. HASLE, M. HARJUMAA, K. SEGERSTÅHL and P. ØHRSTRØM, eds. In: *Persuasive Technology - Third International Conference, PERSUASIVE 2008,* 2008, Springer - Proceedings Series: Lecture Notes in Computer Science pp274-278.

MARCH, S.T. and SMITH, G.F., 1995. Design and natural science research on information technology. *Decision Support Systems,* 15(4), 251-266.

MILLER, G., R., 2002. On Being Persuaded: Some Basic Distinctions. In: J. DILLARD P. and M. PFAU W., eds, *The Persuasion Handbook: Developments in Theory and Practice.* 1 edition edn. Thousands Oaks, California: Sage Publications, Inc;, .

MULLER, M.J. and KUHN, S., 1993. Participatory design. *Commun.ACM,* 36(6), 24-28.

NIELSEN, J., 2000. Designing Web Usability: The Practice of Simplicity. 1 edition (December 30, 1999) edn. Berkeley, USA: Peachpit Press.

NONAKA, I. and TAKEUCHI, H., 1995. The knowledge-creating company: How japanese companies create the dynamics of innovation. New York: Oxford University Press.

NONAKA, I., 1991. The Knowledge-Creating Company. *Harvard Business Review,* 69(6), 96-104.

NONAKA, I. and KONNO, N., 1998. The concept of 'Ba': Building a foundation for knowledge creation. *California management review,* 40(3), 40-54.

NORMAN, D.A., 2005. Emotional Design: Why We Love (or Hate) Everyday Things. First paperback edn. United States of America: Basic Books.

NORMAN, D.A., 2002. The Design of Everyday Things. First paperback edn. United States of America: Basic Books.

OBERMAIR, C., REITBERGER, W., MESCHTSCHERJAKOV, A., LANKES, M. and TSCHELIGI, M., 2008. perFrames: Persuasive Picture Frames for Proper Posture, H. OINAS-KUKKONEN, P. HASLE, M. HARJUMAA, K. SEGERSTÅHL and P. ØHRSTRØM, eds. In: *Persuasive Technology - Third International Conference, PERSUASIVE 2008,* 2008, Springer - Proceedings Series: Lecture Notes in Computer Science pp128-139.

OINAS-KUKKONEN, H. and HARJUMAA, M., 2009. Persuasive Systems Design: Key Issues, Process Model, and System Features. *Communications of the Association for Information Systems,* Vol. 24**,** Article 28.

OINAS-KUKKONEN, H. and HARJUMAA, M., 2008. A Systematic Framework for Designing and Evaluating Persuasive Systems, H. OINAS-KUKKONEN, P. HASLE, M. HARJUMAA, K. SEGERSTÅHL and P. ØHRSTRØM, eds. In: *Persuasive Technology - Third International Conference, PERSUASIVE 2008,* 2008, Springer - Proceedings Series: Lecture Notes in Computer Science pp164-176.

OINAS-KUKKONEN, H., HASLE, P., HARJUMAA, M., SEGERSTÅHL, K. and ØHRSTRØM, P., 2008. Persuasive Technology - Third International Conference, PERSUASIVE 2008, June 4-6 2008, Springer - Proceedings Series: Lecture Notes in Computer Science pp1-286.

ORLIKOWSKI, W.J., 1992. Learning from Notes: organizational issues in groupware implementation, *CSCW '92: Proceedings of the 1992 ACM conference on Computer-supported cooperative work,* 1992, ACM pp362-369.

PARMAR, V., KEYSON, D. and DEBONT, C., 2008. Persuasive Technology for Shaping Social Beliefs of Rural Women in India: An Approach Based on the Theory of Planned Behaviour, H. OINAS-KUKKONEN, P. HASLE, M. HARJUMAA, K. SEGERSTÅHL and P. ØHRSTRØM, eds. In: *Persuasive Technology - Third International Conference, PERSUASIVE 2008,* June 4-6 2008, Springer - Proceedings Series: Lecture Notes in Computer Science pp104-115.

PATTON, M., QUINN, 2002. Qualitative Research & Evaluation Methods. Third Edition edn. Thousands Oaks, California: Sage Publications, Inc.

POLANYI, M., 1966. The Tacit Dimension. Garden City, NY: Doubleday.

RANDALL, D., HARPER, R. and ROUNCEFIELD, M., 2007. Fieldwork for Design - Theory and practice. London: Springer-Verlag.

RANDALL, D., 2007. Book Review. *Computer Supported Cooperative Work (CSCW),* 16(6), 627-630.

RAPP, C., N/A, 2010-last update, Aristotle's Rhetoric [Homepage of Stanford Encyclopedia of Philosophy], [Online]. Available: http://plato.stanford.edu/entries/aristotle-rhetoric/#4.2 [04/5, 2010].

REALITYWORKS, I., 2010-last update [Homepage of http://www.realityworks.com/], [Online]. Available: http://www.realityworks.com/realcare/index.html [02/26, 2010].

REDSTRÖM, J., 2006. Persuasive Design: Fringes and Foundations, W. IJSSELSTEIJN, Y. DE KORT, C. MIDDEN, B. EGGEN and E. VAN DEN HOVEN, eds. In: *Persuasive Technology - First International Conference on Persuasive Technology for Human Well-Being, PERSUASIVE 2006,* 2006, pp112-122.

RITTLE, H.W.J. and WEBBER, M.M., 1973. Dilemmas in a General Theory of Planning. *Policy Sciencens,* 4, 155-169.

RYLE, G., 2000. The concept of mind. 4'th edn. England: Penguin Books.

SAUNDERS, M., LEWIS, P. and THORNHILL, A., 2007. Research Methods for Business Students - Fourth edition. Fourth edn. Essex, England: Prentice Hall.

SCHMIDT, K., 2009. Divided by a common acronym: On the fragmentation of CSCW, I. WAGNER, H. TELLIO, E. BALKA, C. SIMONE and L. CIOLFI, eds. In: *Proceedings of the 11th European Conference on Computer Supported Cooperative Work,* 7-11 September 2009 2009, Springer pp223-242.

SCHMIDT, K., 1991. Riding a tiger, or computer supported cooperative work, *ECSCW'91: Proceedings of the second conference on European Conference on Computer-Supported Cooperative Work,* 1991, Kluwer Academic Publishers pp1-16.

SCHMIDT, K. and SIMONE, C., 1996. Coordination Mechanisms: Towards a Conceptual Foundation of CSCW Systems Design. *Computer Supported Cooperative Work,* **5**(2/3), 155-200.

SCHULTZE, U., 2000. A Confessional Account of an Ethnography about Knowledge Work. *MIS Quarterly,* 24(1), 3-41.

SIMON, H.A., 1996. The Sciences of the Artificial, 3rd Edition. The MIT Press.

SPENDER, J.-. and GRANT, R.M., 1996. Knowledge and the Firm: Overview. *Strategic Management Journal,* 17, 5-9.

TORNING, K., 2008a. Persuasive Technology Design - A Rhetorical Approach, H. OINAS-KUKKONEN, P. HASLE, M. HARJUMAA, K. SEGERSTÅHL and P. ØHRSTRØM, eds. In: *Persuasive Technology - Third International Conference, PERSUASIVE 2008,* June 4-6 2008a, Springer - Proceedings Series: Lecture Notes in Computer Science pp83-93.

TORNING, K., 2008b. THE RHETORICAL SITUATION FOR KNOWLEGDE SHARING OF BEST PRATICES IN CORPORATE ONLINE ENVIRONMENTS. http://www2.warwick.ac.uk/fac/soc/wbs/conf/olkc/archive/olkc3/papers/ edn. Copenhagen: Organization Learning, Knowledge and Capabilities Conference 2008.

TORNING, K. and OINAS-KUKKONEN, H., 2009. Persuasive system design: state of the art and future directions, *PERSUASIVE,* 2009, pp30.

VATZ, R.E., 1973. The Myth of the Rhetorical Situation. *Philosophy and Rhetoric 6,* , 154-161.

VON KROGH, G., 1998. Care in Knowledge Creation. *California management review,* 40(3), p133.

WHO REGIONAL COMMITTEE FOR EUROPE, 15–18 September 2008, 2008-last update, Behaviour change strategies and health: the role of health systems [Homepage of WHO], [Online]. Available: http://www.euro.who.int/Document/RC58/RC58_edoc10.pdf [2/4/2010, 2010].

YIN, R.K., 2009. Case Study Research: Design and Methods, Third Edition, Applied Social Research Methods Series, Vol 5. 4th edn. Thousands Oaks, California: Sage Publications, Inc.

YIN, R.K., 2003. Applications of Case Study Research Second Edition (Applied Social Research Methods Series Volume 34). Second Edition edn. Thousand Oaks, California: Sage Publications, Inc.

# **Appendix 1:** Paper 1

**Title:** Persuasive Technology Design – a rhetorical approach
**Content:** Paper on the situation at Danfoss seen through the lens of rhetorical communication theory.
**Type:** Double blind Peer reviewed
**Published:** Accepted
**Pages:** 11

Book Series Lecture Notes in Computer Science
Publisher Springer Berlin / Heidelberg
ISSN 0302-9743 (Print) 1611-3349 (Online)
Volume 5033/2008
Book Persuasive Technology
ISBN 978-3-540-68500-5

# Persuasive Technology Design – A Rhetorical Approach

Kristian Tørning

Learning Lab Denmark, University of Aarhus
Tuborgvej 164, DK-2400 København NV, Copenhagen, Denmark
krit@dpu.dk

**Abstract.** This article offers a rhetorical design perspective on persuasive technology design, introducing Bitzer's method of the rhetorical situation. As a case study, knowledge workers in an industrial engineering corporation are examined using Bitzer's method. Introducing a new system, knowledge workers are to be given the task of innovating and maintaining business processes, thus contributing with content in an online environment. Qualitative data was gathered and Bitzer's theory was applied as a design principle to show that persuasive technology designers may benefit from adopting rhetorical communication theory as a guiding principle when designing systems. Bitzer's theory offers alternative ways to thinking about persuasive technology design.

**Keywords:** Rhetoric, persuasive design, persuasive technology design, persuasion, knowledge workers, knowledge management, community.

## 1 Introduction

This article investigates the relation between persuasive technology and rhetorical communication theory by applying Lloyd F. Bitzer's [1] model of the rhetorical situation as a lens on qualitative data gathered from an industrial engineering corporation. It is shown that we can find constraints that require mitigation when designing a knowledge sharing system that needs to persuade its own usage. Grounded in the analysis, it is argued that the field of persuasive technology could benefit from the rhetorical communication model and use it to guide design efforts, thus the paper represents a methodological contribution to persuasive design.

## 2 Persuasive Technology and Rhetoric

When we speak of 'persuasive technology' we speak of technology that attempts to change the attitudes or behaviors or both of its end-users without coercion or deception [2]. Persuasive technology is a young field [3]. Only in 2006 was the first conference dedicated to the study of Persuasive Technologies held [4]. Today we speak of the persuasive traits of different types of technologies in a multitude of situations, for instance: health, games and social consciousness. It has been established that computers have unique traits when used for persuasion, namely interactivity [2].

H. Oinas-Kukkonen et al. (Eds.): PERSUASIVE 2008, LNCS 5033, pp. 83–93, 2008.
© Springer-Verlag Berlin Heidelberg 2008

Before the field of persuasive technology came to existence, rhetoric was addressing questions concerning how humans persuade each other and by what means [5]. One famous definition states, "Rhetoric may be defined as the faculty of observing in any given case the available means of persuasion." [6]. Since Aristotle's definition, more modern definitions of rhetoric have been offered, for instance that rhetoric can be seen as an action that humans perform when they use symbols for the purpose of communicating with one another [7]. Both definitions clearly show that rhetoric and persuasive technologies are related since they share the objective of addressing persuasion in a deliberate fashion. It can be noted that in comparison to rhetoric and its theories of written and oral persuasion, computer mediated persuasion is in its infancy. Rhetoric has been concerned with persuasion for more than two thousand years and it might be beneficial for the field of persuasive technology to explore if it is possible to adopt experiences from the field [8].

## 3 The Rhetorical Situation

To explore whether a rhetorical communication theory can act as a guiding principle when planning a persuasive design, Bitzer's theory of the rhetorical situation [1] was chosen for further investigation. This was done for the following reasons:

Firstly, Bitzer's theory is a relatively simple model. Choosing a simple theory allows bridging of persuasive technology design and rhetoric in a not too complex manner. This was appealing since the application of rhetorical communication theory as a lens of persuasive technology design is an attempt to stretch a theory beyond its intended domain.

Secondly, Bitzer's model provides a lot of explanatory power enabling us to conduct a high-level analysis of the *context of persuasion* itself in a given rhetorical situation. The model was expected to offer persuasive technology designers the possibility to better and more explicitly elaborate on design choices made, using a new terminology that would enable them to speak differently of the persuasiveness of systems.

### 3.1 The Constituent Elements of the Rhetorical Situation

According to Bitzer [1], a rhetorical situation has three constituent elements: 'exigence', 'audience' and 'constraints'. The term 'fitting response' is also important to note.

The first of the three, 'exigence' is defined in a rhetorical situation as an "imperfection marked by urgency." [1 p. 6] This imperfection is to be solved or remedied by communication, thus a situation is only rhetorical if it can be resolved with communication that persuades an audience to act in a way that removes the imperfection. For instance, rainy weather could not normally be considered an exigence since talking about it can not change it, whereas global warming can be seen as an urgent imperfection that could be resolved by persuasion. The second constituent element, 'audience', as described by Bitzer "consists only of those persons who are capable of being influenced by discourse and of being mediators of change." [1 p. 8] They can ensure the wanted change, if they are persuaded. Thus a rhetorical audience is comprised only by those capable of being influenced and capable of resolving the exigence. The third element, 'constraints' is described as "persons,

events, objects, and relations that are parts of the situation because they have the power to constrain decision and action needed to modify the exigence." [1 p. 8] Thus constraints are both positive and negative traits of the communication situation that influence the options and choices of the communicator. Lastly, the 'fitting response' is the communication that resolves the 'exigence' by addressing the 'audience' to ensure the wanted outcome. One rhetorical situation can have many fitting responses.

A short example of a classical rhetorical situation could be an election. In a democratic election the candidates are faced with an exigency, namely to persuade the audience to vote for them. The audience is the citizens that can vote, but each member of the audience will only vote for one politician. The candidates communicate deliberately to persuade voters to vote for them. We can imagine numerous constrains for this situation. Let us say that it has been rumored that a candidate will raise taxes. In the situation of an election this could emerge as a negative constraint for that particular candidate. If the candidate is not somehow able to address this rumor he might lose votes or even be prevented from winning the election. The candidate might mitigate the constraint with deliberate communication, possibly by publicly promising that a vote for him will not result in a tax raise. As another example of a constraint, we might observe that some voters are pro-abortion, but some politicians have as a central part of their values that abortion should not be legal. Such a politician could perceive the pro-abortion segment of the audience as not being mediators of change, since they will never vote for him regardless of what he says. In the politician's deliberate communication, he might choose not at all to address a large section of the audience. They are a part of the whole audience, but they are not part of the rhetorical audience, which is defined as part of the audience that can help the politician to resolve his exigence namely getting votes to win the election.

### 3.2 Methodological Benefits of the Rhetorical Situation

From a theoretical perspective, we already note two interesting methodological benefits offered by the rhetorical situation for persuasive technology designers. Firstly, the theory offers a clear delimiter of whether or not it is appropriate to speak of persuasion at all. We can use the theory to speak of situations that are rhetorical and addressable with deliberate persuasive technologies and situations that are not. This is useful when investigating a new situation and considering whether or not to address it with persuasive communication. This is the macrosuasion level of persuasive technology design concerned with the overall persuasive intent of a product [2].

Secondly, the rhetorical situation provides a clear terminology for persuasive technology designers to describe the actual situation they are designing for. From a persuasive perspective, designing a handheld barcode scanner for warehouse workers is not as rhetorical as for example designing a heart rate monitoring sports watch. The latter situation is clearly more rhetorical by nature, since it invites software design that both influences and motivates the end-user to do something voluntary; whereas warehouse workers normally do not have a choice in using the provided barcode scanner.

The rhetorical situation allows for designers to think about the macrosuasion level of the situation they are addressing by noting exigence, audience, and constraints prior to designing a fitting system response. Thus the design can be made more

intentional. This empowers designers when designing objects that are to persuade the end-user in a rhetorical situation.

## 4 Case: Knowledge Workers Sharing Knowledge Online

To further investigate the feasibility of using the rhetorical situation on a macrosuasion level as a lens for persuasive technology design, a case study was conducted. Research was focused on investigating and analyzing the current situation at X-Corp[1], where the management had communicated a wish of introducing virtual best practice communities. They were in need of a design suggestion for that purpose. The aim is not to introduce groupware or document sharing, as these types of software are freely available at X-Corp. Rather the object is to form self sustaining internal online communities that would autonomously maintain existing business processes as well as invent new ones, spotting trends as they emerge and incorporating them into the X-Corp repository of business processes. The software used today for storing such processes is the SharePoint server [9]. Although it offers all the functionality necessary for the task, it unfortunately has proven hard to have employees update processes in this system. In reality, the challenge is to design a new community system that would in itself persuade its own usage, a system that would get or demand priority in the daily work.

Qualitative data was gathered from different sources. Three months of onsite observations took place at X-Corp Global Headquarters. The main activity was observing and engaging with the knowledge workers (KWs), both in work and in social events. The situations that were investigated comprised cross divisional corporate meetings, small and large workshops, meetings in business units and with middle managers. In addition, meetings were held with a multitude of stakeholders and casual lunches as well as informal discussions at the water cooler and in hallways took place. Meetings were documented with notes and interesting facts were noted post event, when that was deemed more appropriate. Data was also gathered both in five loosely structured interviews (20 minutes duration) and in six structured interviews (1½ hours duration).

## 5 Applying Bitzer at X-Corp

Using Bitzer's notion of the rhetorical situation, the data was analyzed in order to understand the rhetorical situation at X-Corp. This was done to investigate whether a fitting system response could be found and developed from this rhetorical perspective.

### 5.1 Exigence

A clear exigence was found. The situation at X-Corp makes it exigent for the management at X-Corp to ensure that continuous development, sharing and learning of business processes can be accelerated to meet the overall corporate strategy of continuous sustainable growth. The global strategy is to ensure a continuous growth

[1] This pseudonym for the company name will be used throughout the paper.

mindset and attitude from the workforce in order for X-Corp to survive against larger competitors that already have a competitive advantage of having more uniform business processes since it has proven less costly to have uniform processes.

X-Corp is historically comprised of three divisions each having their own distinct culture. During the past five years acquisitions of smaller companies have only added to the diversity in business processes. To mitigate this situation, a new cross divisional department has been created: Corporate Business Services (CBS). In the words the Vice President and Chief Development Officer, CBS plays a central role in ensuring the success of X-Corp:

> *The ability to continuously do things better than before needs to become a strong part of our culture. CBS will enable us to take a huge improvement step, sustain it and then take another huge step – over and over again.*

CBS has taken the initiative to diffuse best practices into the whole of X-Corp via dedicated programs addressing certain processes within several business domains: the sales program, the production program, the purchase program, the product development program etc. These programs are establishing the first generation of business processes at X-Corp and also undertaking the diffusion of the processes into the individual business units. Currently, processes are developed by dedicated employees. However having large programmes for this purpose is costly and the future envisioned by the management is that, for instance, sales business processes should be developed and maintained by autonomous heterogeneous communities composed of sales specialists, sales managers, trainers and local people in the field themselves. The management at X-Corp envisions that the employees will work using online technologies maintaining and developing business processes and methods. The communities will assume the responsibility of continuous process innovation within specific areas of competence and ensuring fresh processes based on fresh knowledge available throughout the corporation. Notably, the current system used for sharing processes and keeping documents available is a SharePoint Portal system [9]. The ownership of updating this system is still being handled centrally, in the sense that employees are pushed to update their versions of existing processes and making suggestions for new ones.

For the management at X-Corp, it is exigent that the new community system should influence KWs to positively engage in self sustainable communities of best practice. A fitting system response will be a new system that to a higher degree persuades its own usage.

### 5.2 Audience

According to Bitzer, the rhetorical audience is only comprised of the people that can mitigate the exigence. In the case study presented here, the audience is the KWs at X-Corp. They are a heterogeneous group working in a complex environment with many stakeholders, shifting priorities as well as firm deadlines. A significant portion of the audience will be sales people or sales managers for whom the customer comes first. The person who sells is the person that gets the bonus. The sales people and managers

put in long hours in a very competitive environment. Another segment is specialists and trainers, the people maintaining the training in the context of the existing programmes like the sales programme. They have to travel a lot in order to actually conduct training. These are the two main audiences that can mitigate the change that the management would like to see occur. They are the people that should engage in sharing knowledge autonomously. They are the people that will act as drivers of the communities having the task of determining what processes to focus on next as well as making training materials.

### 5.3 Constraints

Employing the theory of the rhetorical situation, we next turn to see what constraints are on the audience in regards to engaging in self-sustaining communities that are organizing and developing new business processes. Constraints are both the positive and negative traits of the communication situation and its elements in regards to resolving the exigence with communication.

**The audience is a negative constraint:** The first constraint is the audience itself. KWs know more about their jobs than their managers do and have often gained their knowledge through formal education [10]. At X-Corp, some KWs have special domain knowledge from many years of highly specialized work experience within a specific domain. In that sense there is a knowledge gap between the management that sees an exigence and the audience that are mediators of change. Making the audience understand and feel the exigence is a negative constraint in itself.

When speaking of sharing successful best practice sales processes online so that other KWs could perform in a similar fashion, one subject casually explained his view, “People have a hard time telling others the tricks of the trade because it undermines their own identity. It is so difficult to get that knowledge - even in real life.” He went on to argue that he had observed that a dichotomy existed between being a high performer in real life and then sharing the knowledge that made that happen in a community, “If everybody else can do what you do, will you still be high performing or will you turn into a medium performer? Why would you want to do that if you are a hero?”. While everybody theoretically speaking can agree that all would benefit from sharing, in reality, the person who benefits the most is the one not contributing while reaping the benefits of the contributions of others. This has been referred to as the “The knowledge workers prisoner dilemma” [11] and partially also referred to as the utilitarian perspective, where workers employ an individual cost benefit analysis on knowledge sharing [12].

**Time is a negative constraint:** The KWs at X-Corp work very hard. They are to some extent suffering from time famine [13]; during observations it was clear that people worked long hours. They worked from home in the evenings and on some weekends. One employee casually spoke of feeling guilty that she did not spend enough time with her family. In another interview an employee also spoke of the difficulties of maintaining a healthy work-life-balance. Several other signs were observable; people spoke of mail “dying” silently in their mail boxes since there was always too much of it. One subject had disabled the corporate chat client, since it was just another way for her to get work assigned. One secretary explicitly wrote that

people should read her meeting requests, “Please read the whole of this meeting request!”.

**Lack of experience with community software is a negative constraint:** It was discovered that the audience is not particularly tech savvy. Naturally they produce documents and presentations using Office software, but they are not seasoned users of online communities or online communication as such. At loosely structured interviews six random subjects were asked, “Do you use the Internet in your spare time? For what?” All subjects first mentioned mail and when pressed more for other types of usage they first said they did not use the Internet for anything else, but when pressed harder the remembered: internet banking, booking travels and researching for travels. No subjects used the Internet as entertainment or for socializing in communities, chatting or spending time on multimedia content. When asked if they were accustomed with adding content to the Internet, they all replied no. During the onsite observations, no subjects were observed using their computers for community or social purposes. No subjects were blogging, writing in wikis, reading message boards, using social network sites, chatting for personal reasons or similar. During an informal discussion some of these findings with a subject, he humoristically remarked, “If you are very happy in your first life, why would you go into second life?”

Another discovery in regards to contributing with content online was that making KWs update the existing document sharing portal sites was a task that demanded an external driving effort. For some sales people, updating was not a top of mind task or a naturally reoccurring. Clearly for many KWs it was not a very important assignment, nor a highly visible one; it was not an obvious way to be clearly noticed.

**Missing incentives for process innovation is a negative constraint:** In structured interviews it became clear that no uniform incentive structure is in place for process innovation at X-Corp. The only well established reward is a patent award. This award is relatively small compared to the effort needed to get an idea, develop it and finally file a patent. Also, the patent award bonus is often shared as patents are usually the result of a small group effort therefore must be shared among the members of the group. Some subjects spoke of the difference between process and product innovation and made clear that product innovation normally is rewarded more directly. Some subjects mentioned that process innovators might receive oral praise and possibly enhance their chances of a larger yearly bonus.

More constraints could be listed, but for the purpose of this paper, the most explicit findings have been listed and notably no clear positive constraints were found. The constraints were found employing a rhetorical communication theory, but we notice that many of the constraints found already have been arrived at by others using different methods for instance: time [13], lack of clear incentive structure [11], [14], upsetting social structures or position [15] and lack of clear “what’s in it for me” benefit [15] or performance expectancy [16].

### 5.4 Summary of the Rhetorical Situation at X-Corp

After this analysis we may begin to summarize some core findings that a fitting system response will have to address in a meaningful way in order to make the audience becomes mediators of change. It was found that the rhetorical situation

creates an exigence for the management at X-Corp. Seen from the VP's chair, the situation of knowledge not being shared is an imperfection marked by urgency, because the lack of knowledge sharing is not compatible with meeting the demands of the global strategy. But analyzing the rhetorical situation we found that the situation is not necessarily exigent for the KWs that are to actually share knowledge in community's structured formed around best practices. The KWs do not feel that the lack of knowledge sharing is an imperfection marked by urgency since they are under the influence of many other situations that feel more exigent to them for instance displaying good results locally, maintaining good relations with their colleagues and nearest manager, making the sales that would result in a fat bonus etc.

The management is somewhat in control of this part of the rhetorical situation. They have the power to make room for the new community tasks in a serious manner, for instance making clear what work would disappear from the KW's agenda to make time for engaging in the online community. Hence, a fitting system response must be deeply anchored in the organization in particular at the management layer. Any KWs nearest manager must also feel that this work is indeed important – that it is exigent.

However, more time will not suffice to resolve the exigence. A fitting system design will also have to offer a clearer benefit an egoistic value proposition targeted directly at KWs. The sharing of knowledge must make as much sense seen from a KW's chair at a local business unit as it does from the chair of a VP at the global headquarters. The unspoken KW question is, "What's in it for me?" That question is not answered by replying, "This software is really usable"; "We really want you to share knowledge" or "The corporate strategy depends on it". The posture taken by some KWs at X-Corp has also been dubbed the utilitarian perspective [12]. Following this perspective, it is assumed that when it comes to sharing knowledge at a corporation, individuals are calculative and driven by self interest, and further that the individual and collective interests are at odds or even fundamentally incompatible since the individual that owns or holds the knowledge can choose to, or not to, share it. Thus, sharing becomes the object of the individual's analysis of benefits over costs [12]. The difference between the work contexts of KWs and blue collared workers becomes strikingly apparent in that blue collared workers will normally have to adopt the system provided to them, whereas KWs might simply not adopt a system provided.

### 5.5 Fitting System Response: A Social Incentive Proposal?

The case analysis of the rhetorical situation at X-Corp makes it possible to address the exigence with it a deliberate persuasive system design. Having analyzed the situation we can begin to produce intentional design suggestions that directly address the context of persuasion itself.

Regardless of the system introduced or strategy chosen, there is a clear need to focus on the *mutual benefit* of both management and the community participants. A new system could, for instance, ensure that the work on best practices online is made highly visible at least on the Intranet. This could be part of a social incentive structure, in reality a different type of value offer. If not directly offering a monetary recognition, then a social reward in the form of exposure. Another practical dimension would be is to ensure time for the actual work to be done in the system. This naturally reaches far beyond the scope of designing software. This must be

addressed as part of the rhetorical situation; however here I will focus more on the aspects of the IT system itself.

One possible fitting system response could be to address the exigence held by the management by offering the KWs a clear functionality benefit. The aim of the effort could be to develop software that would truly empower the KWs in such a fashion that it was a clear benefit in itself. Such a fitting system response would however require offering the KWs a system that could enable real 'intelligence amplification' [17] in regards to process innovation. The software would simply have to empower its users to outperform non-users. Naturally, this is very hard to do. Since the object of this software is to gather share and innovate new best practices for business processes, I would argue that a pure functionality offer is not feasible and that X-Corp should instead focus its design efforts on other types of values.

Another possible fitting system response might simply be to introduce communities without anchoring them in the context of best practices. A first step might be to design a communication experience ensuring the KWs positive experiences online regardless of the KWs possibly being more social than productive. In that sense the development of best practices would be seen as a secondary design criterion (or even an ulterior design motive). Thus, the first step is to address the KWs capability to engage, without having to work, and then later introduce the shared distributed tasks of maintaining processes as well as adding ideas to new ones. The qualitative data showed that the KWs observed and interviewed did not have much experience with social software.

A final fitting system response offered in this paper would be to allow the communities to form around the KWs natural egoistic needs. This could for instance be done by offering a corporate link service. Offering such a service would allow for the individual user to store his links in a smarter fashion than locally in his browser. Adding a network effect to this functionality has both proven popular on the World Wide Web [18] and in a corporate context [19]. In this way the individual KW is not working for somebody else, but as long as he maintains his own links, he and others can benefit from the network effect of all members doing so for instance seeing what the most popular links are or exploring the links of likeminded KWs. We could imagine sales people gathering information about the competition in this manner.

More inspiration for fitting system responses might be found by observing systems already making users perform in a desired manner. Within the realm of Web 2.0 [20], community systems are very successful in attracting dedicated users that produce staggering amounts of content (Facebook [21], Wikipedia [22], Youtube [23], etc). Although this is not done in the context of work, we might learn from the structures behind these contributions. Unfortunately they are not very well described in the literature. For instance, investigating what motivates voluntary contributions in Wikipedia [22] Nov remarks that "no empirical, quantitative data is available that illustrates why people contribute to outlets like Wikipedia," and points out that there is a need for better understanding of this phenomenon [24]. Nov measured eight different volunteering motivations and found that the top reasons for contributing was "fun" and "ideology". Ideology was understood as sharing in the altruistic open source sense. This was almost antithetical to the KWs at X-Corp who were not found to be altruistic in sharing and were not observed to be having any fun on the SharePoint server. Far clearer incentives must be presented up front for communities

of best practice to succeed at X-Corp. A few examples of such value have been supplied here. But more research needs to be done to clarify this difficult question.

## 6 Conclusion

This paper was aimed at applying a rhetorical communication theory directly as a guiding principle for designing persuasive technology in a corporate context. A perspective on persuasive technology design was thus presented, and using this new angle it was shown how designers of persuasive technologies might benefit from analyzing the rhetorical situation for framing the context of persuasion itself prior to actually designing persuasive technologies.

Analyzing qualitative data and employing Bitzer's model of the rhetorical situation, it was found that best practice communities at X-Corp must offer something in addition to mere functionality in order to present a fitting system response that would make KWs contribute. By employing Bitzer's theory, it was possible to determine the main constraints in the rhetorical situation at X-Corp and shift the focus of the design considerations to address the main negative constraints, i.e. time, lack of clear incentive structure, upsetting social structures and the lack of clear "what's in it for me" benefit. Some of these constraints are addressable with software and some of them are not. Shear lack of time or even time famine is probably not something we can address with a community system.

It was found that the approach envisioned by the management at X-Corp in reality reflected mostly on the immediate exigency of ensuring continuous growth. Bitzer's theory was applied and yielded the discovery that the management should address the rhetorical situation in a different way, namely by offering alternative values to the KWs. Thus the main design criterion is not to enable or to empower knowledge sharing, but to devise a system that motivates knowledge sharing in a self sustainable way.

## 7 Future Work

Moving forward, the research should firstly aim at describing characteristics of the creative and innovative activities that KWs undertake in the early phases of innovation when developing business processes. This could be done focusing on designing new products, processes or services using collaboration software. The object of the research could be to investigate whether it is possible to uncover types of processes that are addressable with technology and which are not. Secondly, research should be undertaken to describe the motivational factors that must be present if knowledge workers are to take part in gathering, communicating and innovating new business processes in an online environments. Thirdly, as touched upon in this paper, it might be possible to gather some generic issues that most designers of collaboration software will sooner or later face when they design software that aims at supporting innovation activities.

Overall this could enable designers of collaborative working environments to address the motivational-context, when designing these environments to be deployed in a global distributed organization.

## References


1. Bitzer, L.F.: The Rhetorical Situation. Philosophy & Rhetoric 1, 14 (1968)
2. Fogg, B.J.: Persuasive technology - using computers to change what we think and do. Morgan Kaufmann Publishers, San Francisco (2003)
3. Fogg, B.J.: Persuasive Computers: Perspectives and Research Directions. In: CHI 1998 Los Angeles USA, April 18-23, 1998, p. 225 (1998)
4. IJsselsteijn, W., Kort, Y., Midden, C., Eggen, B., et al.: First International Conference on Persuasive Technology for Human Well-being. In: IJsselsteijn, W., de Kort, Y., Midden, C., Eggen, B., van den Hoven, E. (eds.) PERSUASIVE 2006. LNCS, vol. 3962. Springer, Heidelberg (2006)
5. Olmsted, W.: Rhetoric an historical introduction. Blackwell Publishing, Great Britain (2006)
6. Aristotle: Rhetoric (350 B.C.E)
7. Foss, S.K., Foss, K.A., Trapp, R.: Contemporary perspectives on rhetoric, 2nd edn. Waveland Press Inc., Prospect Heights, Illinois (1985)
8. Christensen, A.-K. K., Hasle, P.F.V.: Classical Rhetoric and a Limit to Persuasion. In: de Kort, Y., IJsselsteijn, W., Midden, C., Eggen, B., Fogg, B.J. (eds.) PERSUASIVE 2007. LNCS, vol. 4744, pp. 307–310. Springer, Heidelberg (2007)
9. Microsoft Corporation, http://office.microsoft.com/sharepoint/
10. Drucker, P.F.: The essential drucker - the best of sixty years of peter drucker's essential writings on management. First Collins, New York (2005)
11. Brodie, M., Lai, J., Lenchner, J., et al.: Support Services:Persuading Employees and Customers to do what is in the Community's Best Interest, pp. 121–124 (2007)
12. Jian, G., Jeffres, L.W.: Understanding Employees' Willingness to Contribute to Shared Electronic Databases - A Three-Dimensional Framework. Communication Research 33, 242–261 (2006)
13. Perlow, A.L.: The Time Famine: Toward a Sociology of Work Time. 44(44) 57–81 (1999)
14. Bansler, P.J., Havn, C.E.: Knowledge Sharing in Heterogeneou Groups: An Empirical Study of IT-Support for Sharing Better Practices. In: The Third European Conference on Organizational Knowledge, Learning and Capabilities (2002)
15. Grudin, J.: Groupware and Social Dynamics - Eight Challenges for Developers. Communications of the ACM 37 (1994)
16. Venkatesh, V., Morris, M.G., Davis, G.B., et al.: User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly 27 (September 2003)
17. Engelbart, D.: http://www.bootstrap.org/augdocs/friedewald030402/augmentinghumanintellect/1introduction.html
18. del.icio.us, http://del.icio.us/
19. Millen, D., Yang, M., Whittaker, S., et al.: Social Bookmarking and Exploratory Search, pp. 21–39
20. O'Reilly, T., http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html
21. Facebook, http://facebook.com/
22. Wikipedia, http://en.wikipedia.org/
23. YouTube, http://www.youtube.com/
24. Nov, O.: What Motivates Wikipedians. Communications of the ACM 50, 60–64 (2007)

# **Appendix 2:** Paper 2

**Title:** THE RHETORICAL SITUATION FOR KNOWLEDGE SHARING OF BEST PRATICES IN CORPORATE ONLINE ENVIRONMENTS
**Content:** Similar to paper 1, however more details about the transformation of data and perspectives drawn to WEB 2.0
**Type:** Double blind Peer reviewed abstract
**Published:** Accepted:
**Pages:** 16

Conference website
http://www.olkc.net/

Direct link to publication
http://www2.warwick.ac.uk/fac/soc/wbs/conf/olkc/archive/olkc3/papers/contribution280.pdf

# THE RHETORICAL SITUATION FOR KNOWLEDGE SHARING OF BEST PRATICES IN CORPORATE ONLINE ENVIRONMENTS

Kristian Tørning[1]
Learning Lab Denmark, University of Aarhus

**ABSTRACT**

This paper focuses on the situation to be addressed, when designing IT systems for Knowledge Workers that are expected to participate in both sharing and innovating work processes within a large corporation in communities of best practices. The work presented is based on: philosophical analysis, qualitative data from a global corporation and Web 2.0 design artifacts from the World Wide Web. It is argued that we may benefit from addressing the design a Knowledge Management Systems with rhetorical communications theory as an alternative way of prescribing designs that would make the users feel the need to communicate knowledge.

**KEYWORDS**

Rhetoric, Knowledge sharing, KMS, communities of practice, online communication, Knowledge Contribution, Community

## 1. INTRODUCTION

Drucker speaks of a century of social transformation and the emergence of the knowledge society (Drucker, 2005) and the rise of the knowledge workers (KWs) and how they differ from blue-collar workers since their jobs requires: formal education, the ability to acquire and apply theoretical and analytical knowledge and above all a habit of *continual learning* (Drucker, 2005). Firms can thus be conceptualized as an institution for integrating knowledge and given that assumption you may argue that the only real sustainable competitive advantage is effective and efficient organizational knowledge management (Grant, 1996). Knowledge Management (KM) may be defined as identifying and leveraging the collective knowledge in organizations to help the organizations compete by turning knowledge resources into value-creating activities (von Krogh, 1998). Knowledge Management Systems (KMS) may be defined as systems that aid in sharing knowledge in organizations (King & Marks, 2008). Currently we do not have a single clear approach to the development of KMS (Watson, 2001) and management in many organizations has discovered that the availability of electronic communication technologies is no guarantee that knowledge sharing will actually take place (Wasko & Faraj, 2005). Bansler and Havn (2002) provide us with a recent example of a costly KMS that was abandoned after three years. Despite very dedicated efforts including solid attention from top management, the KWs simply did not adopt the system that was designed for them (Bansler & Havn, 2002). Many more examples could be mentioned (Coakes, 2004) suggesting that the deliberate design of KMS is a complicated affair. While some internal KMS have problems with gaining committed users, we can observe that some Web 2.0 systems have staggering amounts of users. Websites like Myspace.com, Facebook.com and Linkedin.com have users

[1] Corresponding author: Kristian Tørning, Learning Lab Denmark, University of Aarhus, Tuborgvej 164, DK-2400 København NV, Copenhagen, Denmark, Mobile: (+45) 51 51 29 32, email: krit@dpu.dk

contributing plenty of content. Furthermore these systems run on intrinsic motivation alone, without managerial prompting. Users are contributing on a voluntary basis in their spare time. From a practical perspective the following research question emerges: Would we be able to address the motivational-context of KWs when designing KMS for globally distributed organizations by adopting Web 2.0 concepts?

Here a case study is presented that took place to investigate how we might design KMS addressing the motivation of KWs. The data is analyzed from the perspective of rhetorical communication theory. The paper is organized as follows: First, the case is explained. Second, the research approach and the sources of data gathered are described. Third, Lloyd Bitzer's theory of the rhetorical situation is introduced and applied as a lens for analyzing the data from a communication perspective. Lastly, the findings' implications for the design of the KMS is discussed and parallels are drawn using two examples of Web 2.0 concepts.

## 2. THE CASE

X-Corp[2] is a global engineering company with 20,000 full time employees. It is historically comprised of three divisions each having their own distinct culture. During the past five years acquisitions of smaller companies have only added to the diversity in business processes. It has been decided that X-Corp will undergo a global transformation project, where the culture will be shifted towards an employee mindset focused on continuous process innovation. To drive this effort, a new cross divisional department has been created: Corporate Business Services (CBS). In the words the Vice President and Chief Development Officer, CBS plays a central role in ensuring the success of X-Corp:

> "The ability to continuously do things better than before needs to become a strong part of our culture. CBS will enable us to take a huge improvement step, sustain it and then take another huge step – over and over again".

CBS has taken the initiative to diffuse best practices into the whole of X-Corp via dedicated programs addressing certain processes within several business domains since uniform processes are less costly. This has been done by establishing programs that will develop and diffuse first generation of business processes at X-Corp. There is a need for a new KMS for this purpose. The current system both serves as a knowledge repository for getting information and for learning processes. The new system will be designed specifically to support development and innovation of new processes and serve as a repository for existing ones. Better facilitation of ideation and innovation of processes is needed, for instance allowing the employees to make suggestions for new processes or suggest changes to existing ones. User generated content is a must; for this effort to succeed the KWs must actively produce and contribute content.

## 3. DATA GATHERED

Qualitative data was gathered to investigate what might motivate the employees to contribute with content in a KMS. Overall observations were primarily focused on the current mode of innovating work practices, the methods employed, the KWs contributions to the current KMS and the planning of the new KMS. A multi-method

[2] This pseudonym for the company name will be used throughout the paper.

approach was employed (Creswell, 2003; Saunders et al., 2007). This was done with an emphasis of getting an understanding and gaining an inside view of X-Corp in general (Ghauri & Grønhaug, 2005). Data was gathered from stakeholders that were to use the KMS or that were already using the current system, the Process Reference Guide (PRG). I spoke to employees that would aid in the design and realization of the new system including a senior strategic advisor from the IT department. I was included in internal communication in the department that was responsible for the KMS and I had access to central people that were driving the effort from the CBS department. I also had access to the current system employed. I spoke to the employees that were taking care of the administrative tasks of usage such as adding new users. These people were all engaged in meetings and informal discussions. Most effort was put on the users that were to drive the KMS and to ensure that content was developed and being added and the KWs that were to add content. In the first phase of the research data was gathered in five loosely structured interviews (20 minutes duration) and in six structured interviews (1½ hours duration). The loosely structured interviews were recorded. The structured interviews were transcribed at the time of the interviews. I assumed the role of a secretary; asking questions and then typing down the answer. I would allow for the subjects to first use one formulation and later change it and then retype their final formulation thus sending the meaning back to them (Kvale, 1996). At times I would eagerly make notes of everything, but I found it to have a negative effect on subjects as it interrupted their thinking, they would simply pause their speaking and wait for me to catch up. I found this brought too much attention to me being a researcher. More often bullet points were noted with specific quotes that I found to hold some essence of the situation at hand. The longitudinal dimension of the research was a stay of three months at X-Corp spread out over a period of approximately nine months. While staying on site at X-Corp Global Headquarters observations took place. The main activities were observing and engaging with the employees both in work and in social events. The situation investigated comprised cross divisional corporate meetings, meetings in business units and with middle managers; also presentations were given explaining the purpose of the research and providing some examples of social software from the Internet. Meetings were held with a multitude of stakeholders from different departments and at different levels in the organization. While staying onsite it became natural to engage with employees in casual lunches as well as in informal discussions near the water cooler and in hallways or just over the desk when working late at the office. Observations also took place in several corporate workshops, participating in process development innovation workshops. After two months of onsite observations, an early stage PowerPoint work-in-progress prototype was used as a basis for opening up a frank discussion, of what a system was to offer if it were to motivate the usage of itself in the fast paced environment. Artifacts in terms of internal documentation were gathered: annual reports, newsletters, photographs of venues as well as whiteboards and events. Slide decks, spreadsheet tools and documents as well as examples of their use. All the data and the activities served as the foundation for understanding the current situation for contributing and innovating business processes and how that might take place in a distributed fashion in an online system at X-Corp.

## 4. STRETCHING RHETORIC BEYOND ITS INTENDED DOMAIN?

I decided to examine KWs situation at X-Corp from a rhetorical communications perspective as I speculated that we might observe communication itself as a trace of motivation. One definition of rhetoric is that it is an action that humans perform when they use symbols for the purpose of communicating with each other (Foss et al., 1985). We can say a rhetorical action has occurred when someone does something for the

purpose of communicating to another person (Foss et al., 1985). Any deliberate utterance can therefore be seen as communication with a purpose or motive. For instance, KWs do not use symbols to communicate to other KWs via KMSs for no reason; they only do so if they are *motivated,* be that by culture or managerial prompting or something else. Was KWs at X-Corp in a situation that would make them communicate about best practices and the development of new ones online? To have this type of communication occur was in essence the main KMS design criterion. I hoped that analyzing the data from the perspective of communication using a rhetorical theory might generate novel insights into the design of KMS systems or verify existing ones.

## 5. BITZER'S RHETORICAL SITUATION EXPLAINED

Bitzer (Bitzer, 1968) argues that a rhetorical work functions to produce action in the world and is controlled by the rhetorical situation which generates it. This rhetorical situation is comprised of any combination of persons, events, objects and relations which *requires* rhetorical response. There are three major constituents of any rhetorical situation: 'exigence', 'audience' and 'constraints'. The term 'fitting response' is also important to note. The first of the three, 'exigence' is defined in a rhetorical situation as an "imperfection marked by urgency." (Bitzer, 1968, p. 6). This imperfection is to be solved or remedied by communication, thus a situation is only rhetorical if it can be resolved with communication that persuades an audience to act in a way that removes the imperfection. Thus the exigence is a condition calling for action functioning as the organizing principle of the discourse, for instance, rainy weather could not normally be considered an exigence since talking about it cannot change it, whereas global warming can be seen as an urgent imperfection that could be resolved by persuasion. The second constituent element, 'audience', as described by Bitzer "consists only of those persons who are capable of being influenced by discourse and of being mediators of change." (Bitzer, 1968, p. 8). They can ensure the wanted change if they are persuaded. Thus a rhetorical audience is comprised only by those capable of being influenced and capable of resolving the exigence. The third element, 'constraints' is described as "persons, events, objects, and relations that are parts of the situation because they have the power to constrain decision and action needed to modify the exigence." (Bitzer, 1968, p. 8) Thus constraints are both positive and negative traits of the communication situation that influence the options and choices of the communicator. They are elements inherent in the situation or developed by the speaker, which *constrain* the decision or modify the exigencies. Lastly, the 'fitting response' is the communication that resolves the 'exigence' by addressing the 'audience' to ensure the wanted outcome. We need to note that one rhetorical situation can have many fitting responses. Bitzer himself uses the assassination of President Kennedy as an example and describes how that situation demanded a specific kind of appropriate fitting response. Being pragmatic we can use Bitzer's definition of the rhetorical situation to state that the reason for communication in a certain sense is to end communication itself. We address imperfections marked by urgency to fix them and move on with our lives. We should also note that Bitzer's model is very broad in essence it is a philosophical model for all human communication. If we for instance engage in small talk at a bus stop, it could be exigent to us to break an embarrassing moment of silence – thus addressing a rhetorical situation that has arisen, namely that the silence feels uncomfortable.

Bitzer's theory was heavily criticized by Vats (Vatz, 1973) in his article "The Myth of the Rhetorical Situation." In short Vatz argues that Bitzer's model is too deterministic. Bitzer for instance states: "While the existence of a rhetorical address is a reliable sign

of the existence of situation, it does not follow that a situation exists only when the discourse exists." (Bitzer, 1968, p. 2), Vatz on the other hand argues that humans as subjects cause situations and that free human actions can lead to exigencies emerging in the form of rhetorical situations. Using the "Cuban Missile Crisis" as an example, Vatz states that it only became a crisis as politicians and government officials began addressing it as such (Vatz, 1973). Vats critique of Bitzer is mostly concerned with two things: First there is the general ontological objection that situation does not occur as such. Vatz cannot subscribe to the notion that a situation has an objective existence detached from human interpretation. Second, Vatz fears that the field of rhetoric will be reduced to a parasitic construct attached to disciplines that describe reality, for if rhetorical situations can exist detached from human interpretation then rhetoric is no longer as essential as for instance philosophy or economics (Vatz, 1973).

Regardless of what ontological implications that possibly could lurk beneath the surface of Bitzer's model, it is composed of only three constituent elements and it still offers us explanatory power in regards to understanding communication in a simplified form. The model also allows us to prescribe characteristics of a fitting response, since we can describe what a fitting response must mitigate in order to make the make audience mediators of change.

## 6. DATA TRANSFORMATION USING BITZERS THEORY

When transforming qualitative data into conclusions according to Saunders, we may sort our qualitative data into meaningful categories derived from an existing theoretical framework (Saunders et al., 2007). The rhetorical situation was employed as a theory for categorizing data to hopefully discover emergent structures in the data gathered (Saunders et al., 2007). Since Bitzer offers clear categories in the form of the constituent elements: 'exigence', 'audience', 'constraints', his model could be applied by reinterpreting the data: reviewing notebooks, interviews, artifacts and relistening to recordings as categories emerged they were categorized in accordance with the model (Ghauri & Grønhaug, 2005) . Naturally not all data fit into the categories, thus in reality a fourth category came to existence: non constituent data elements. For the purpose of this paper, Bitzer's model was applied as an analysis tool mapping two different perspectives: One was the rhetorical situation as seen from the KWs perspective and the other was the rhetorical situation seen from the perspective of the top level management.

## 7. THE RHETORICAL SITUATION AT X-CORP A DICHOTOMY

By applying Bitzer as described above, two clear exigencies were found. For the management a clear exigence was found. It is exigent for the management at X-Corp to ensure that continuous development, sharing and learning of business processes can be accelerated to meet the overall corporate strategy of continuous sustainable growth. True to Bitzer's model a rhetorical situation *emerged* for the management: global competition, the sub-prime crisis, increase in prices for raw materials and a well defined benchmark group showing that uniform processes was more profitable – all these issues emerged as a whole forming a rhetorical situation that was exigent for the management. It had become an imperfection marked by urgency that a continuous growth mindset and attitude from the workforce was not prevailing at X-Corp, while competitors were already reaping the benefits from more uniform and updated processes and thus less costly business processes. This exigence set the agenda for the whole corporation and hard measures were set for the profitability of X-Corp. However a dichotomy was

detected as it emerged that uniform business processes, continuous learning and improvement were not seen as truly exigent from the perspective of the KWs that were to do the actual sharing in communities formed around best practices.

| THE RHETORICAL SITUATIONS AT X-CORP | | |
|---|---|---|
| | Management | Knowledge Worker |
| Exigence(s) | • Employees must share knowledge in a self sustainable way to ensure profitability.<br>• Uniform business processes, continuous learning and improvement are the way to ensure growth and profitability. | • To solve issues currently most important to me, my nearest manager and my business unit.<br>• Daily operations.<br>• Getting things to work. |
| Audience | • Knowledge Workers at X-Corp | • Nearest manager & Colleagues |
| Constraints (Positive) | • Employees understand that the bench mark group is doing better and change is needed.<br>• Many employees would like a more uniform set of processes and clearer communication. | • Passion and willingness to work with business processes.<br>• Genuine interest in improving<br>• Employees are interested in being autonomous and not having to deal with several management layers in order to change modes of work. |
| Constraints (Negative) | • Primarily all the constraints of their audience the knowledge workers<br>• Management is under the influence of multiple exigencies. Many things are exigent at the same time; a KMS is just one of them.<br>• Management is not tech savvy<br>• Management is leading people with more domain knowledge than themselves.<br>• Identity issues:<br>  ○ Identity might be partly upset by new free and open technologies.<br>  ○ Might not always be genuinely interested in free flow of all information in all situations.<br>  ○ Unease at what unleashing new tech such as blogs and wikis might bring in terms of free communication. | • Lack of time – or even time famine<br>• Sharing Knowledge is yet another meta-thing to do. Innovating and maintaining business processes is only a part time task. Extra work – but no clear "what's in it for me"-aspect.<br>• Working online has very low visibility.<br>• Lack of clear incentives<br>• Lack of experience with online community software.<br>• Task is presented as very important, but this is not clearly reflected in everyday work.<br>• The culture of i.e. Sales Peoples is not dominated by altruism and openness. Even in real life it is hard to obtain the 'tricks of the trade'<br>• Current system has a somewhat weak ethos, not all employees find it fun or giving to use it. |

*Table 1: Rhetorical situations at X-Corp.*

Below I elaborate on the main constraints that would need mitigation if a fitting response were to be made for the KWs to engage in the new KMS:

**Time famine and shifting priorities:** Time famine, a term coined by Leslie Perlow (Perlow, 1999) refers to a state where employees simply do not have any time at all to spare. At X-Corp it was observable that people were too busy to actually conduct all their work. During onsite observations it was clear that people worked long hours, in particular leading up to training events. During these events both support office employees and the attending KWs worked as much as 16 hours a day. During normal work hours at the global HQ one employee mentioned feeling guilty not spending enough time with her family. Also, an immediate need to execute on a specific subtask could clear the calendar. This naturally caused ripples in the KWs planning, but important ad hoc tasks came and they had to be resolved and were given priority over normal work. Several KWs spoke openly about mail "dying" in their mail boxes, since there was always too much of it. Another subject had chosen to disabled the corporate chat client, since she felt it was just another way to get additional work assigned to her. Mass emails would sometimes contain a plea to actually read them: "Please read the whole of this meeting request!"

**Lack of experience with community software:** In loosely structured interviews six random subjects were asked, "Do you use the Internet in your spare time? For what?" All subjects first mentioned mail and when pressed more for other types of usage they mentioned: banking and travel booking. When asked if they were accustomed with adding content to the Internet, they all replied no. While staying onsite no KWs were seen using social software during work hours. During a speech to 34 middle managers, they were simply asked: "Can we have a show of hands how many in here use social software, community software such as: Linkedin (www.linkedin.com), Orkut (www.orkut.com), facebook (www.facebook.com) or Myspace (www.myspace.com)?" only 6 people did. Discussing these findings with a more tech savvy subject, he humoristically remarked, "If you are very happy in your first life, why would you go into second life?"[3]

**Current system has a weak ethos:** Sharing knowledge and developing and innovating business processes was often considered yet another meta-thing to do in the sense that it was an extra thing to do that was not the work itself. For most of the people involved innovating and maintaining business processes was only a part time task. It was one of many things that they were *supposed* to engage in. Even the support office specialists at the Global Head Quarters that were driving the change effort at X-Corp had a whole variety of things to do. The employees managing the current Process Reference Guide system made it clear that making KWs update the system was a task that demanded an external driving effort in the form of managerial prompting. One subject who was involved in maintaining the current KMS said:

> "Sometimes I have the impression that they are just uploading something, so that they can say that they did it."

When being walked through a PowerPoint prototype showing a sub set of a new system the immediate conclusion from the participants was that they would not use it unless it provided a real benefit for them to check into the system every morning. Despite

[3] Second Life® is a online 3-D virtual world created by its users: www.secondlife.com

explaining about a possible overall benefit of such a system the KWs still openly spoke of a: "What's in it for me?"-factor, they did not perceive the suggest system design to really be helpful for them.

**Important task and direction setting:** Although the task of ensuring the diffusion and development of uniform business processes and tools was presented as very important, it was less clear in the daily work for the individual KW. This was partly due to the fact that many things were very important. In general, it was observed that daily operations took priority over updating processes, despite very clear direction setting. For instance, at a quarterly meeting for the Business Support Department and its programmes, a Vice President quite bluntly stated that, "Unless the target of XX millions is met this year, it is not that likely that the Executive Board would just say: 'Well let's try with some more millions next year and see what happens...'" As an observer it was hard to determine whether it was aimed at invoking a sense of urgency and seriousness – or if it was a shear fact and that he knew the programmes would be cancelled the following year, if targets were not met this year. Later I brought it up in a conversation with a KW and asked her what she thought. She mentioned that, "It did not leave you thinking *we can do it;* it made me think f*** this is really tough."

**Missing incentives for process innovation:** In structured interviews it became clear that no uniform incentive structure was in place for business process innovation at X-Corp. The only well established innovation reward was a relatively small patent award. Some subjects mentioned that product innovation normally was rewarded in a more direct fashion. Some subjects mentioned process innovation might receive oral praise and that it could impact the yearly bonus positively. However when discussing sales processes at a workshop the discussion broke: Why would a sales person be interested in participating in a new system on a regular basis? Sales people for instance think very strongly in reward structures, these are part of the sales process, i.e. bonuses for successful sales. The discussion was hinting that financial rewards at least were something that acted as a driver in real life. Again the "what's in it for me"-factor surfaced. On another occasion a subject explained that the culture of the sales peoples was not one of openness. He remarked that even in real life it was hard to obtain the "tricks of the trade". He argued that there was no real reason to share such information, since it would in a sense only allow your internal competitors to gain on you. Why would you risk that? Also, the work done in the current system was hardly visible, the system was not the best place to get a promotion.

### 7.3 Known issues found

We must note that the negative constraints uncovered by the analysis have also been found by employing other theories, and thus the negative constrains found are as such not entirely new, but the approach taken employing rhetorical communication theory to arrive at them are. The constraints found here have also been discovered by others using different methods, for instance: time (Perlow, 1999), lack of clear incentive structure (Bansler & Havn, 2002; Brodie et al., 2007), upsetting social structures or position (Grudin, 1994) and lack of clear "what's in it for me" benefit (Grudin, 1994) or performance expectancy (Venkatesh et al., 2003). The main conclusion of the rhetorical analysis is that it might not make sense to share seen from the perspective of the individual KW. This is mostly due to time constraints, a lack of a sharing culture and an unclear "What's in it for me"-proposal. The overall posture taken by many KWs at X-Corp has been dubbed the utilitarian perspective (Jian & Jeffres, 2006). According to this perspective individuals are calculative and driven by self interest, when it comes to

knowledge sharing. Sharing itself becomes the object of the individual's analysis of benefits over costs (Jian & Jeffres, 2006). As whole substantial negative constraints were found and they indicate that daily sharing, innovation and development of business practices online is unlikely to occur. This poses a business management problem at X-Corp: How do we address such a situation with a KMS design?

## 8. A WEB 2.0 PARALLEL

As a perspective on the situation at X-Corp, this section will explore how we might benefit from adopting certain concepts from Web 2.0 when designing KMS. The main reason being that Web 2.0 websites have very dedicated users. Fueled by intrinsic motivation, users add content to websites for free. For some reason it is exigent for those users of to add content and those sites are experiencing enormous growth.

A compact definition of Web 2.0 is that:

> "Web 2.0 is the network as platform, spanning all connected devices; Web 2.0 applications are those that make the most of the intrinsic advantages of that platform: delivering software as a continually-updated service that gets better the more people use it, consuming and remixing data from multiple sources, including individual users, while providing their own data and services in a form that allows remixing by others, creating network effects through an "architecture of participation," and going beyond the page metaphor of Web 1.0 to deliver rich user experiences." (O'Reilly, 2008).

Some of the most notable feature components of Web 2.0 include: wikis for collaborative writing, blogs for easy content publishing, a search paradigm in general, social networking (with profile pages), tagging content and reuse of data in the form of mashups (remixing). In general this is accompanied by a richer user experience, as the web pages are moving away from being static documents towards being small software applications running in a browser. In addition users are adding a lot of value in the form of content for instance Google maps (maps.google.com), where users can post descriptions if of certain locations. Possibly some Web 2.0 concepts could aid us in addressing the rhetorical situation at X-Corp or even further allow for us to develop a different posture when designing KMS directly addressing the KWs motivation to contribute.

## 9. A FITTING SYSTEM RESPONSE?

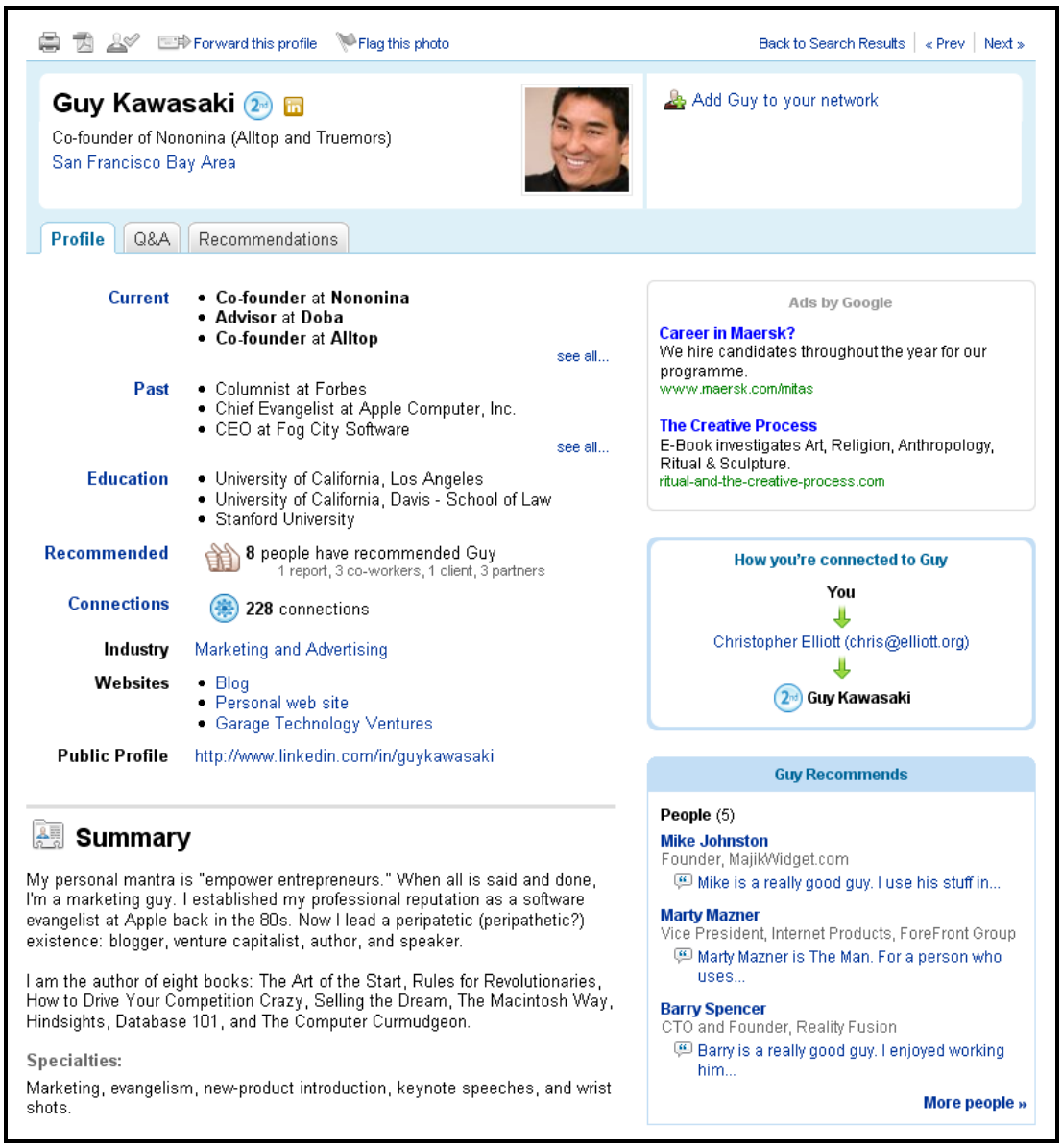
According to Bitzer (Bitzer, 1968), the fitting response is the communication that resolves the exigence by addressing the audience to ensure the wanted outcome. Since this paper deals with a technology solutions, we are in fact looking for a *fitting system response* that might resolve the exigence of the management at X-Corp. This is naturally different from just defining or communicating a message since a KMS is an interactive system. We must also note that some of the negative constraints found might be beyond the scope of IT and KMS. For instance monetary incentives are something that must be addressed outside of the realm of IT. We might however directly address the problem that sharing knowledge can be seen as paradoxical for the KWs, since giving away knowledge results is a loss in unique value relative to what others know (Wasko & Faraj, 2005). As designers we will then have to ask ourselves: Why would clever highly educated KWs take part in something that in a sense undermines their own identity? We cannot answer that question by stating that: "It is corporate strategy", "We really need it to become more profitable" or similar. Those are unfitting responses since

they do not mitigate the constraints inherent in the rhetorical situation. We will have to shift our focus to the end-user needs.

Web 2.0 communities they cater to socializing and possibly a sense of belonging and even identity reinforcement. If we somehow design KMS that invoke those types of feelings in users, then this might be the main lever towards gaining the attention of the KWs. King and Marks remark that employees are intrinsically motivated when their needs are directly satisfied (e.g., self-defined goals) or when their satisfaction lies in the content of the activity itself. Conversely, extrinsic motivation emanates from external sources, such as those that are involved in supervisory control (King & Marks, 2008). We may observe Maslow's classical hierarchy of humans needs (Maslow, 1943) as a guide towards what might be given priority by KWs. According to Maslow once lower level needs such as food and safety are covered people ultimately aspire towards covering higher level needs such as esteem and self-actualization (Maslow, 1943; Maslow, 1998). Consistent with this aspiration, Maslow points out that self-actualizing people actually assimilate the work into their identity of self, the work thus becomes part of individual's definition of himself (Maslow, 1998). We can hypothesize that if we could possibly design systems that would cater to KW's esteem needs and ultimately self-actualization, rather than knowledge sharing as such, those types of systems could possibly even partly solve time issues. If KMS designers can offer a very tempting added value catering to intrinsic motivation we might be able to persuade KWs to spend 10 minutes a day using and browsing a KMS. This approach would lessen the need for extrinsic motivators such as managerial prompting. Exploring this concept further we might almost regard the knowledge sharing itself as secondary or *ulterior design motive*. We should remember that a negative constraint found at X-Corp was lack of experience with community software. It might be strategically wise to build a strong foundation for sharing best practices by designing a system that is fun, entertaining and does not seem too much like additional work, but that in fact would make the KWs contribute valuable knowledge in the form of meta-data. In the following two sections I will offer two concrete examples of how this takes place in the domain of Web 2.0 social software.

### 9.1 Linkedin

At Linkedin (www.linkedin.com), people are documenting their own results and success while maintaining network relations with peers. LinkedIn offers its users the possibility to maintain a resume and their personal professional contacts while staying updated on their activities. The system offers both social navigation and news of the network itself. When you join, you create a profile that summarizes your professional accomplishments. When a user updates his resume his contacts receive an automatic notification. Users may also search the entire network including the contacts of contacts and view their profiles. This concept is very compelling, when designing a new KMS at X-Corp, a good start might be providing the KWs with internal profile pages where they are not asked to document much more than their own success and performance. This might easily be tied into real life. Anchoring the online efforts could be as simple as ensuring that KWs bring a print of this online list of accomplishments for their performance reviews. This design suggestion would mainly accomplish two things: Firstly it would offer the KWs an opportunity to show their professional accomplishments, but secondly it also caters to the ulterior design motive, in the sense that the KWs would also be building a community of searchable profile pages that may aid in locating the right person, addressing the problem of knowledge coordination i.e. finding the right resource (Sambamurthy & Subramani, 2005).

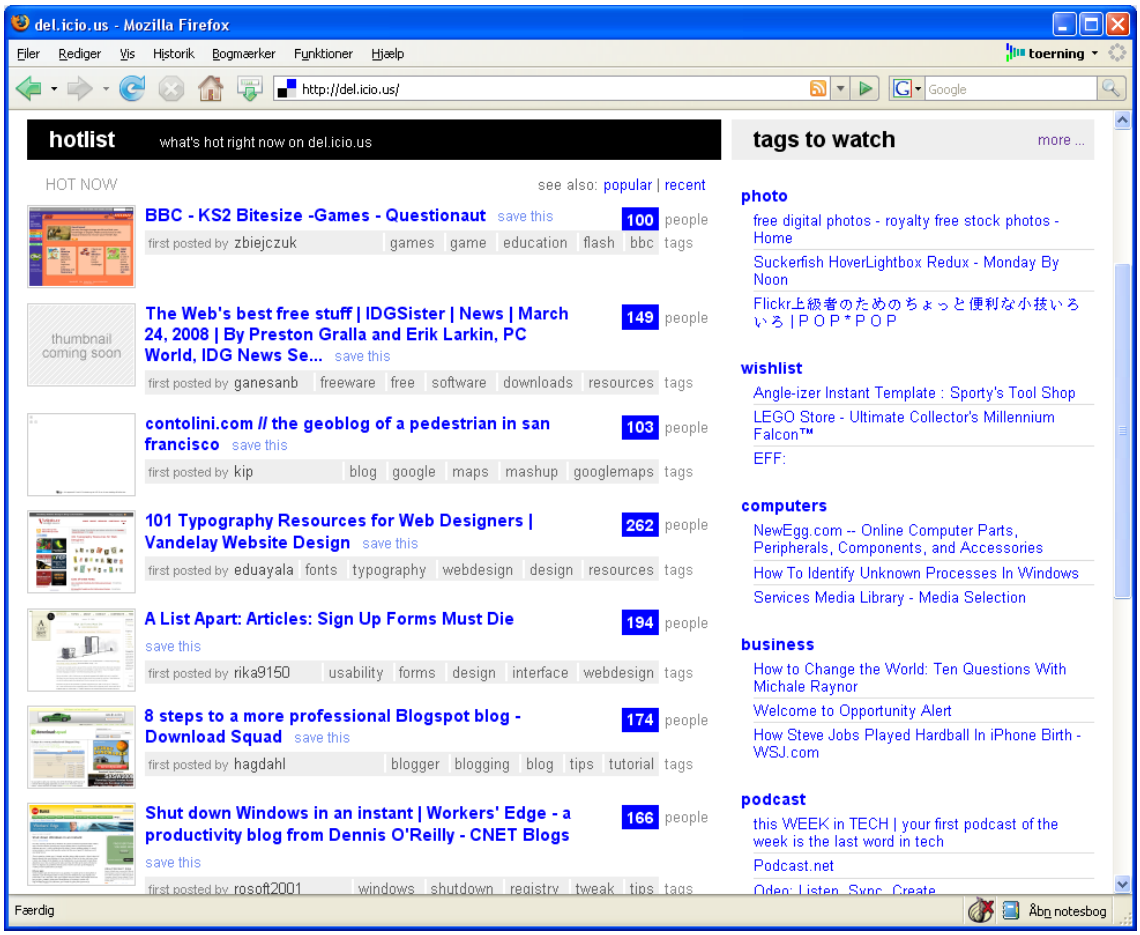



*A cutout of a linkedin profile webpage (25/3-2008): We can observe many social cues for instance the opportunity to recommend someone and help them build a reputation as well as links to other contacts profile pages. Also we can see the degrees of separation between the person in the profile page and the person browsing the page. Not seen here, but as part of the cutout above, is a full resume containing former workplace, functions and projects that the person have been and is engaged in.*

In this approach to the design of a KMS, the purpose does not seem to be a KMS allowing all possible explicit knowledge to be documented and shared. Rather, the approach could be to offer a space where the individual KW could socialize. This addresses one of Wenger's basic premises of communities of practice, the importance of facilitating that informal connections can occur (Wenger & Snyder, 2000; Wenger, 2004). Currently at X-Corp, it is hard to find the people that you might share a common interest with, but as suggested with the example above Web 2.0 address that issue with a different technology response. Once there actually is a sense of online community at X-Corp, we might push harder for the development of specific practices, for instance by allowing KWs to form groups across business units, departments and divisions. This approach would be very different from asking KWs to document their skills and their project track record.

### 9.2 Del.icio.us

Del.icio.us (www.del.icio.us) is another Web 2.0 example. Del.icio.us offers social bookmarking by letting users 'tag' links. A tag is simply a word or label used to describe a bookmark. Most Internet browsers employ a hierarchical folder structure for bookmarks. Tags differ as the end user can makes them up as they need them, using as many tags as they like on one bookmark. This aids in organizing and finding personal data, but its implications reaches further. When someone else posts related content using the same 'tag' it is visible. We can thus view all shared bookmarks about "sweets" and see the most popular items tagged "sweets".[4] In effect the users begin building a collaborative repository of related information; moreover the first user to actually contribute with link resource is clearly credited.

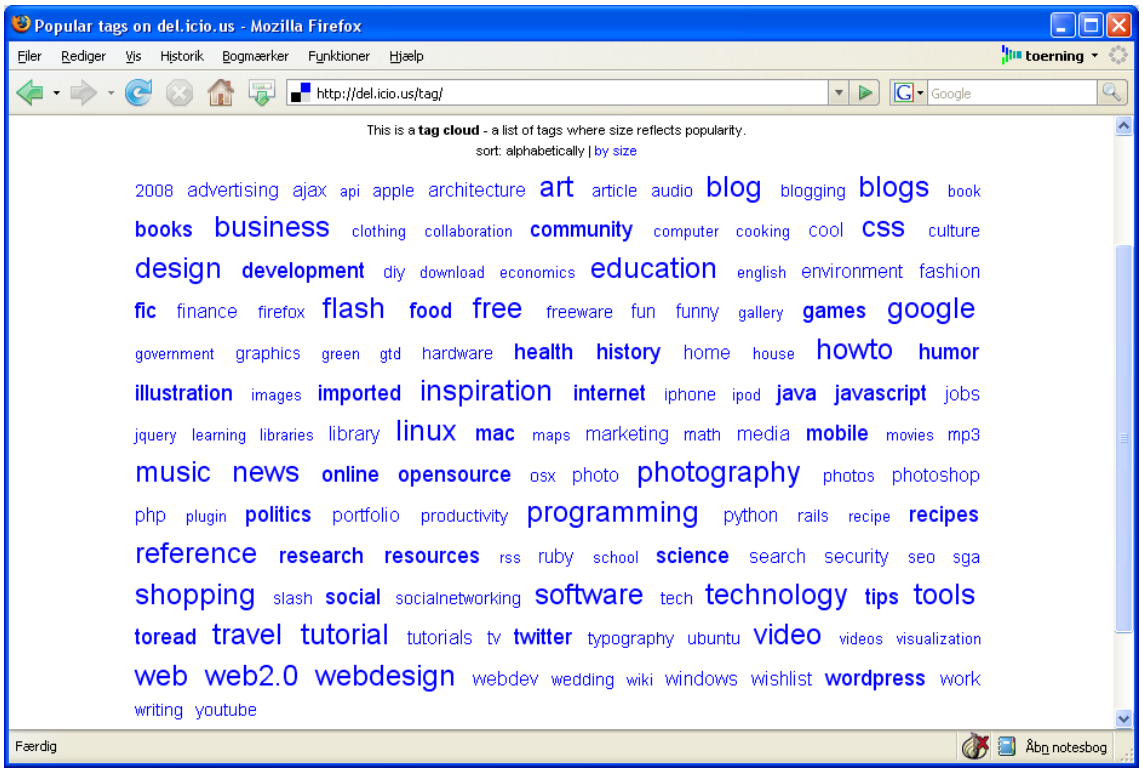



*Screenshot of http://del.icio.us/tag/ (25/3-2008)- in the front page of the site we find a "hotlist" that displays the most bookmarked sites of the hour as well as who was first to contribute the link. In the column to the right we can see "Tags to watch"*

IBM (www.ibm.com) has recognized this potential and developed a community evolved around social bookmarking (Millen et al., 2007). In studies they found it to be very successful in offering social navigation and a better way to store bookmarks. Introducing this type of design would offer KWs at X-Corp a novel way of storing, organizing and sharing bookmarks, while simultaneously documenting explicit knowledge about important links. For instance, new employees might find such a

[4] All bookmarks tagged sweets are listed at http://del.icio.us/tag/sweets and the most popular bookmarks tagged sweets are listed at http://del.icio.us/popular/sweets.

system valuable when browsing the corporate intranet. Such a system would also aid in bolstering a sense of community on the corporate system intranet. Again, this approach is very different from directly telling KWs to file links for the common good of all employees. Instead, social bookmarking offers a clear benefit for the individual namely maintaining bookmarks and allowing for a more advanced organization of bookmarks, but in doing so the users actually end up sharing knowledge. No user is really working for the sake of others, but simply tending to one's own egoistic bookmarking needs allows for the collective to benefit from exploring link resources in a new way. For example, an employee looking for someone knowledgeable in marketing can look at "marketing" tag to see who has been bookmarking pages around that topic, and further see what other tags this person has. Lastly this type of bookmarking allows for novel visualizations of most frequently used tags:




*Screenshot of a Tag cloud via: http://del.icio.us/tag/ (25/3-2008)*

## 10. CONCLUSION

A theory from the domain of rhetoric has served as the main theoretical foundation for this paper. It was explored how we might use a communication theory to analyze a situation to be addressed with technology. Several negative constraints were identified from qualitative data by applying Bitzer's theory of the rhetorical situation. A gap between the employees and the management emerged. Although the managers at X-Corp, for good reasons, wanted to gain a competitive advantage for the firm by having KWs sharing knowledge and developing processes the situation analyzed did not invite that type of communication from the KWs that were to contribute and communicate. Many of the constraints discovered had previously been described in earlier research, but here a novel approach was taken to arrive at similar conclusions by different means.

The communications perspective on information technology offered a particularly important approach to pre-qualifying designs of KMS that are to gain adoption and

endure real usage in organizations. By drawing parallels to Web 2.0, it became clearer that a fitting system response could be to approach KMS design as the design of a social software platform, since that might make it feel more exigent for the KWs to actually communicate, contribute and participate. In a sense the main design criterion would be to actually get the KWs to adopt the KMS. This would in a sense make knowledge sharing an ulterior design motive. The primary design criterion would be to offer the KWs clear functionality with a clear "what's in it for me"-value proposition in a fashion where knowledge sharing naturally occur as seen in the two Web 2.0 examples presented. With this approach to KMS design the KWs would be sharing knowledge, but not under that label. From a conceptual view it seemed that this sort of approach might in particular help in solving the problem of knowledge coordination (Sambamurthy & Subramani, 2005) by making it easier to find the right person for instance via profile pages or via a person's bookmarks. The research question was thus answered and based on this study it seems feasible to address the motivational-context of KWs at X-Corp by adopting Web 2.0 concepts and features as they may play an important part in a fitting system response.

## 11. LIMITATIONS AND VALIDITY

The data and conclusions that this paper is based on result from action research using qualitative methods, as such the conclusions are biased by my view upon it (Ghauri & Grønhaug, 2005; Kvale, 1996) . Another possible bias when applying a theoretical framework like Bitzer, rather than developing new categories from codification, is forcing premature closure of the issues being investigated (Saunders et al., 2007). However the studies undertaken at X-Corp spanned 9 months and also Bitzer's categories are coarsely grained. Finally, the interpretation of the data partly took place while still gathering data, thus early findings were validated with KWs at X-Corp through discussions.

## REFERENCES


Bansler, P., J, & Havn, C., E. (2002). Knowledge sharing in heterogeneous groups: An empirical study of IT-support for sharing better practices. The Third European Conference on Organizational Knowledge, Learning and Capabilities, (2002) Athens, Greece.

Bitzer, L. F. (1968). *The rhetorical situation*Pennsylvania State University Press, University Park, Pa. 16802 ($0.50).

Brodie, M., Lai, J., Lenchner, J., Luken, W., Ranganathan, K., Tang, J., M., et al. (2007). Support services:Persuading employees and customers to do what is in the community's best interest. *Second International Conference on Persuasive Technology, PERSUASIVE 2007,* Palo Alto, CA, USA. 121-124.

Coakes, E. (2004). Knowledge management--a primer. *Communications of AIS, 2004*(14), 406-489.

Creswell, J., W. (2003). *Research design - qualitative. quantitative, and mixed methods approaches* (Second ed.). California: Sage Publications Inc.

Drucker, P. F. (2005). *The essential drucker - the best of sixty years of peter drucker's essential writings on management*. New York: First Collins.

Foss, S., K., Foss, K., A., & Trapp, R. (1985). *Contemporary perspectives on rhetoric* (Second Edition ed.). Prospect Heights, Illinois: Waveland Press Inc.

Ghauri, P., & Grønhaug, K. (2005). *Research methods in business studies - A practical guide* (Third ed.). Essex - England: Person education limited.

Grant, R. M. (1996). TOWARD A KNOWLEDGE-BASED THEORY OF THE FIRM. *Strategic Management Journal, 17*, p109.

Grudin, J. (1994). Groupware and social dynamics - eight challenges for developers. *Communications of the ACM, 37*(1)

Jian, G., & Jeffres, L., W. (2006). Understanding employees' willingness to contribute to shared electronic databases - A three-dimensional framework. *Communication Research, 33*(4), 242-261.

King, W. R., & Marks, J. (2008). Motivating knowledge sharing through a knowledge management system. *Omega, In Press, Corrected Proof*(36), 131-146.

Kvale, S. (1996). *InterViews: An introduction to qualitative research interviewing*Thousand Oaks - Sage.

Maslow, A., H. (1998). *Maslow on management*. USA: John wiley & sons, Inc.

Maslow, A., H. (1943). A theory of human motivation. *Psychological Review 50,*

Millen, D., Yang, M., Whittaker, S., & Feinberg, J. (2007). Social bookmarking and exploratory search. *Proceedings of the 10th European Conference on Computer-Supported Cooperative Work,* Limeric, Ireland,. 21-39.

O'Reilly, T. *Web 2.0 compact definition.*http://radar.oreilly.com/archives/2005/10/web-20-compact-definition.html

Perlow, A., L. (1999). The time famine: Toward a sociology of work time. *Administrative Science Quarterly, 44*(1), 57-81.

Sambamurthy, V., & Subramani, M. (2005). SPECIAL ISSUE ON INFORMATION TECHNOLOGIES AND KNOWLEDGE MANAGEMENT. *MIS Quarterly, 29*(1), p1.

Saunders, M., Lewis, P., & Thornhill, A. (2007). *Research methods for business students - fourth edition*

Vatz, R. E. (1973). The myth of the rhetorical situation. *Philosophy and Rhetoric 6,* , 154-161.

Venkatesh, V., Morris, M., G., Davis, G., B., & Davis, F., D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3)

von Krogh, G. (1998). Care in knowledge creation. *California Management Review, 40*(3), p133.

Wasko, M., M., & Faraj, S. (2005). WHY SHOULD I SHARE? EXAMINING SOCIAL CAPITAL AND KNOWLEDGE CONTRIBUTION IN ELECTRONIC NETWORKS OF PRACTICE. *MIS Quarterly, 29*(1), p35.

Watson, R. T. (2001). REVIEW: KNOWLEDGE MANAGEMENT AND KNOWLEDGE MANAGEMENT SYSTEMS: CONCEPTUAL FOUNDATIONS AND RESEARCH ISSUES. *MIS Quarterly, 25*(1), p1.

Wenger, E. (2004). Knowledge management as a doughnut: Shaping your knowledge strategy through communities of practice. *Ivey Business Journal, Ivey Business Journal January/February*(2004) http://www.iveybusinessjournal.com/article.asp?intArticle_id=465

Wenger, E., & Snyder, W. (2000). Communities of practice: The organizational frontier. *Harvard Business Review, 78*(1), 139-145.

# **Appendix 3:** Paper 3

**Title:** Persuasive System Design: State of the Art and Future Directions
**Content:** A literature review of persuasive design.
**Type:** Double blind Peer reviewed.
**Published:** Accepted, Published on ACM (poster session).
**Pages:** 8

ACM International Conference Proceeding Series; Vol. 350 archive
Proceedings of the 4th International Conference on Persuasive Technology table of contents
Claremont, California
ISBN:978-1-60558-376-1
http://portal.acm.org/citation.cfm?id=1541989

## AUTHOR STATMENT

The authors of the paper:

"Persuasive System Design: State of the Art and Future Directions"
In.
*ACM International Conference Proceeding Series; Vol. 350 archive*
*Proceedings of the 4th International Conference on Persuasive Technology*
*Claremont, California*
*Year of Publication: 2009*
*ISBN:978-1-60558-376-1*

hereby state that the author contribution ratio for paper is as follows:

Kristian Torning has contributed with 75%
Harri Oinas-Kukkonen has contributed with 25%

---

Date: 22.6.2009

Kristian Torning
Copenhagen Business
School, Dept.
Organization
Kilevej 14A, 4
2000 Frederiksberg,
Denmark

---

Date: 16.6.2009

Professor Harri Oinas-Kukkonen
University of Oulu,
Dept. Information
Processing Science
Rakentajantie 3
FIN-90014 Oulu
Finland

Doctoral School of Organisation and Management Studies OMS
Copenhagen Business School

# Persuasive System Design: State of the Art and Future Directions

Kristian Torning

Copenhagen Business School, Dept. Organization
Kilevej 14A, 4
2000 Frederiksberg, Denmark
+45 3815 2815

Stanford University
H-STAR Research Institute
Cordura Hall
210 Panama Street
Stanford, CA 94305-4115
USA

kristian.torning@gmail.com

Harri Oinas-Kukkonen

University of Oulu, Dept. Information Processing Science
Rakentajantie 3
FIN-90014 Oulu, Finland
+358 (0)8 553 1900

Stanford University
H-STAR Research Institute
Cordura Hall
210 Panama Street
Stanford, CA 94305-4115
USA

Harri.Oinas-Kukkonen@oulu.fi

## ABSTRACT
This paper provides an overview of the current state of the art in persuasive systems design. All peer-reviewed full papers published at the first three International Conferences on Persuasive Technology were analyzed employing a literature review framework. Results from this analysis are discussed and directions for future research are suggested. Most research papers so far have been experimental. Five out of six of these papers (84.4%) have addressed behavioral change rather than an attitude change. Tailoring, tunneling, reduction and social comparison have been the most studied methods for persuasion. Quite, surprisingly ethical considerations have remained largely unaddressed in these papers. In general, many of the research papers seem to describe the investigated persuasive systems in a relatively vague manner leaving room for some improvement.

## Categories and Subject Descriptors
H.1.2 [Models and Principles]: User/Machine Systems – human factors, software psychology. H.5.2 [Information Interfaces and Presentation (e.g. HCI)]: User Interfaces – theory and methods, user-centered design.

## General Terms
Design, Human Factors

## Keywords
Literature analysis, persuasive systems, persuasive technology, persuasive design, behavior change, attitude change, sustainability, interaction design, design methods.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, to republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.
*Persuasive'09*, April 26-29, Claremont, California, USA.
Copyright © 2009 ACM ISBN 978-1-60558-376-1/09/04... $5.00

## 1. INTRODUCTION
This paper investigates the current body of research knowledge about persuasive systems produced during 2006-2008. This is accomplished through a structured literature review and analysis based on the Persuasive Technology conferences. This conference series is the only well-established scientific forum dedicated to persuasive systems design so far. It was deemed appropriate to investigate the field now, since the first three years of conferences provide a critical mass of research for review. The aim of this analysis is to recognize the predominant research themes and methodologies as well as the design approaches in the field.

In using technology as a vehicle of persuasion, we touch upon a central part of being human, namely intentional communication. Whenever we communicate deliberately with a clear purpose and outcome in mind, we are engaging in persuasion. This is not new; but building 'machines' that conduct persuasion on our behalf is. When Aristotle in 400 B.C. defined rhetoric as "…the faculty of observing in any given case the available means of persuasion" [1], he could not have dreamed that one day such a faculty would include deploying systems designed to infuse cognitive and/or emotional changes, in essence delegating the persuasion itself to be conducted by machines. From a historic perspective, such conduct has only recently become possible [2]. As society at large continues to adopt systems that persuade, it becomes increasingly relevant for us to understand how to design such technologies and how to analyze them. In dealing with technology-mediated persuasion, we venture into an area that sits at the intersection of many disciplines and that can be studied from many diverse viewpoints; this is due to the omnipotent nature of persuasion.

At least four recognized key computer-based fields of research for persuasive systems and design can be recognized: human-computer interaction, computer-mediated communication, information systems, and affective computing. We should also observe two key disciplines from the humane sciences namely psychology and rhetoric, as they address core aspects of human persuasion and the cognitive traits that apply within that area.

*Human-computer interaction* as a discipline is concerned with enabling humans to design computer systems that are usable and

understandable; including how information can be gathered for such designs. The object is to create cognitive models that allow for users to interact (or communicate) with machines so that we may operate them [3, 4].

*Computer-mediated communication* investigates how technology affects our modes of communications, what happens when a message travels via computers between humans, and how the technology transmission impacts the communication. This includes the study of synchronous and asynchronous communication.

*Information systems* approach treats the software, databases, and the content provided for the user as a systemic whole and it emphasizes usefulness, i.e. the organizational and end-user benefit to be reaped from this. Many of these systems are developed for work contexts. [5].

*Affective computing* helps recognize, interpret, and process human emotions. Thus, the aim is to create systems that can express affect but also perceive affect; in essence creating systems that can interpret the emotional state of its human users and also change the machine response accordingly thus presenting a fitting response [6].

*Psychology* as an academic discipline is concerned with the study of human behavior by examining mental processes. It describes important cognitive traits of humans, their perception and their emotions. Among other things, the study of human motivation resides in the field of psychology. Traditionally cognitive psychology has played a large part in computer interface design as such [7].

*Rhetoric* holds a special place in the study of computer-mediated persuasion [8, 9], as rhetoric is the father of both modern humanistic thinking and philosophy coining the term persuasion itself [1, 10, 11]

The disciplines mentioned above overlap and are very broad areas. However, we must also note that none of these *on their own* encapsulate technology-mediated persuasion; rather they seem to touch upon some aspect of it. What distinguishes persuasive systems from other systems is that persuasive systems are inherently transformative. Persuasive systems deliberately attempt to infuse a cognitive and/or an emotional change in the mental state of a user to transform the user's current cognitive state into another planned state. The focus of any persuasive system must be a *technology-mediated transformation of either attitudes or behaviors, including a transformation by bolstering or reinforcing existing attitudes or behaviors* [12, 13].

The paper falls in three sections: Firstly, we will present the selected research method and describe the framework for literature review as well as the selection of the papers included in the review. Secondly, we will explain our gathering of data, the analysis, and the findings. Thirdly, we will outline the implications and future directions for the researchers and practitioners in the field.

# 2. Research method

It would have been possible to search for research papers published in a broad range of journals, e.g. in the fields described in previous section, that that would touch upon individual elements of persuasive technology. However, the annual Persuasive Technology conferences represent the most coherent body of research knowledge on the topic. To ensure the quality of the research work, we included only full peer-reviewed papers for the analysis. Notes, short papers and posters may naturally hold both interesting and valid knowledge, but oftentimes they describe work-in-progress. We also omitted invited keynote papers since they had not undergone the same type of review process as the submitted full papers. This brought the total body of papers to be reviewed to 51 [17, 18, 19] (2006: 13, 2007: 21, and 2008: 17).

The literature review was conducted by employing the Persuasive Systems Design model (hereafter the PSD Model) [12] as the framework. This model provides a recent and extensive conceptualization of technology-mediated persuasion. While the model was originally created to prescribe persuasive designs and software requirements, it also supports categorizing and mapping of persuasive elements which makes it applicable for the literature analysis. The model was originally presented at the Persuasive Technology 2008 conference [13], and an extended version of it has been published in the Communications of the Association for Information Systems [12]. The latter version was used for the work presented here. To compensate for any shortcomings in the model, we used some additional variables. A total of 35 variables were extrapolated from the PSD model and adopted for the literature review framework and four variables were added for further clarity.

## 2.1 The PSD Model: Persuasion Context

In the PSD model, the *Persuasion context* comprises elements influencing whether persuasion can take place. The context itself is composed of the intent, event, and strategy. See Fig. 1.

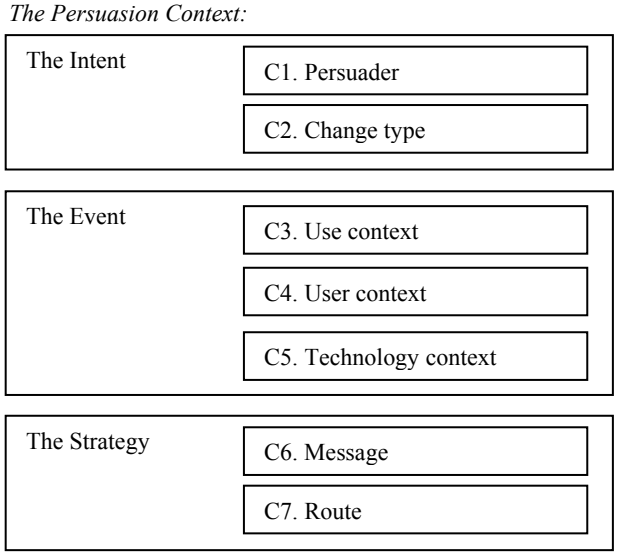



**Figure 1.** Core components of the PSD Model [12].

**The intent:** The intent includes the *persuader* (C1, C to denote Context) and the deliberate target behavior that the system is to cause in the user (C2). The persuader is the system designer; designing the system that is to persuade its users. The persuader addresses the overall deliberate behavior or attitude change that resides at the macrosuasion level in which the overall intended change in attitude or behavior is to take place. In reviewing and

categorizing the research work we carefully observed whether the papers offered clear descriptions of C1 or C2.

**The event:** The event contains the: use, user, and technology sub-contexts. The *use context* (C3) refers to the problem domain dependent features [12] in the form of well-known problems in the domain. The *user context* (C4) includes, for instance, goals, commitments, compromises, and lifestyles. In other words, it refers to the individual application user and also to her individual traits. The *technology context* (C5) refers to the features of the technological platform. Some aspects of persuasion can be bound with the technology itself. For instance, there might be differences between persuasion through mobile phones and through desktop computers in a similar manner as there are differences between persuading in speech and writing. For each research paper, it was noted if authors clearly described the technology context. We ended-up categorizing the papers here with the following technology categories: mobile, desktop, OEM/custom, multiple, ubiquitous, or other. Most web applications were categorized as 'desktop', whereas a web application specifically designed for mobile usage was categorized as 'mobile'. The OEM/custom category was applied to prototype products that were considered unique, for instance an interactive flower pot bowl [20] or an experimental use of a large screen display and a hand controller.

**The s trategy:** The model emphasizes two strategic elements, namely the message and the route. The *message* (C6) refers to the form and/or content selected to deliver the intended transformation; it is the fashion in which the persuader chooses to convey his persuasion for the planned (behavior or attitude) change. The content could be statistical data about the health risks of smoking, but the form might vary as this information could be given to the application user in raw text, it could be built into a dialogue system, or it could be revealed during the course of a game. The persuasive designer in his design attempts to fit with the content and form in such a manner that the user may be persuaded into changing his cognitive stance. The *route* (C7) for persuasion can be direct, indirect, or both [12]. A direct approach would be to provide one or a few solid arguments, whereas an indirect route would rely on a number of facts rather than on one or only a few convincing arguments. A system might also employ both approaches simultaneously, for instance, offering clear rational arguments while employing design patterns which in themselves have been proven persuasive. Another example might be to use an avatar with a specific voice type to present the message, which may make the actual delivery of the content more persuasive. The users might be unaware that of the persuasiveness of the design pattern or the avatar but they would still feel more inclined to be persuaded through the design choices made by the designer.

The PSD Model encompasses many elements that one would expect to find in a communication model for speech, writing, or media in general. If we as researchers wish to embed a message in a system, we need to exhibit awareness of such elements (even if not necessarily using those exact labels). Unless these elements are reasonably clear in disseminations, readers will not be able to determine what actually took place, who was persuaded of what, and by what means.

## 2.2 The PSD Model: Design Principles

The second leg in the PSD Model focuses on the persuasion itself, describing how an application may be persuasive on an operational level. The model describes four dimensions. Each of these addresses an aspect of technology-mediated persuasion. These are relatively well-known persuasive elements that may be employed for persuasive system design. The dimensions are primary task support, dialogue support, system credibility support, and social support; they are described in more detail in the [12].

**Primary task suppor t:** This dimension addresses the target behaviors. For this dimension seven categories are employed: reduction (P1, P to denote principle), tunneling (P2), tailoring (P3), personalization (P4), self-monitoring (P5), simulation (P6), and rehearsal (P7). In the analysis, it was noted which types of primary task support the research work mainly employed, if any, and whether a paper employed more than one design principle.

**Dialogue suppor t:** This dimension deals with the feedback that the system offers in guiding the user to reach the intended behavior. This dimension also employs seven design principles for providing dialogue support: praise (P8), rewards (P9), reminders (P10), suggestion (P11), similarity (P12), liking (P13), and social role (P14).

**System credibility support:** In general, credibility (or ethos) is a persuasive element. The PSD model operates with seven design principles for supporting system credibility: trustworthiness (P15), expertise (P16), surface credibility (P17), real world feel (P18), authority (P19), third party endorsements (P20), and verifiability (P21).

**Social suppor t:** Social support is another greater category that affects the overall persuasiveness of a software system. The model operates with seven design principles for providing social support: social learning (P22), social comparison (P23), normative influence (P24), social facilitation (P25), cooperation (P26), compensation (P27), and recognition (P28).

## 2.3 Additional variables

In addition to the elements derived directly from the PSD Model, we also registered four additional variables that were deemed relevant in analyzing the papers to reach a finer level of granularity and clarity.

For each of the papers, it was noted whether *ethics* was addressed (A1, A denoting Additional variable). Only papers that discussed ethics at some length were included. Thus, mentioning ethics on the fly in a single sub clause would not count here.

It was also noted whether or not the papers clearly described the *transformation* (A2), if any, that had taken place. For example, did the test subjects rate one condition significantly higher than another, or did the system users' self-reports clearly demonstrate one design being more persuasive than another?

For each paper, we also registered the meta-data of *contribution type* (A3). This was used to recognize whether the paper was conceptually or empirically oriented. Only papers which provided original data were considered 'empirical', whereas papers which borrowed data from previous research as well as theoretical discussions were considered as 'conceptual' contributions.

When possible we also noted *the sample size of the subjects* (A4).

# 3. Results

Different kinds of papers provide very different types of contributions. Experimental papers mainly describe existing

persuasive systems, whereas conceptual papers typically deal with a higher abstraction level and discuss the key concepts behind the systems. Of the 51 papers reviewed the dominant contribution type (A3) was experimental: 62.7% (n=32), whereas 37.3% (n=19) were conceptual. The sample size (A4) of experimental papers varied from 3 to 400, the median being 88. The relatively high median was mostly a result of many surveys in the data.

## 3.1 Persuasion Context

### *3.1.1 The intent*

**The persuader** (C1). Quite surprisingly, only 28.1% (n=9) of the reviewed 32 experimental papers clearly stated the persuader so that it was possible to extract 'who was speaking'. In most cases, it was simply not possible to explicitly recognize the deliberate persuader. Stating that 'a system was built to…' does not reveal much about the motives of the speaker and what traits might apply to him in the context of the persuasion itself. Stating that work was financed by a grant from a certain governmental body does not allow us to gain a deeper insight either. A large part of understanding persuasion pertain the persuaders: Who are they? What did they stand to gain from the change? Was it the scientists that build the system themselves or did they act as persuasive system spin doctors preparing a 'speech' for someone else?

**Change type** (C2). Of the 32 experimental papers 81.3% (n=26) stated the change that they were aiming at in a clear manner. Some of these papers did not clearly state their target, but in reviewing the papers it became clear, for instance, that the target was some sort of a behavioral change. Three papers (9.4%) did not state clear change and for three papers (9.4%) it did not apply (experiments that attempted to uncover an aspect of persuasion itself, rather than persuading users of something). Of the same 32 experimental papers 84.4% (n=27) addressed behavioral change and only five (15.6%) aimed at infusing an attitude change.

That behavior was mostly addressed is probably due to the fact that behavior change is in most cases easier to study than attitude change. For instance, in most HCI studies testing two interface conditions can be conducted as clearly quantifiable lab studies within a given timeframe and with a limited budget, whereas the temporal dimension of measuring longer term attitude change makes it more complex and may demand much more complex modes of inquiry. According to Oinas-Kukkonen and Harjumaa [12, 13] persuasion in full happens only when an attitude change takes place.

Optimally, any persuasive systems designer aims to create a system which enables a predictable deliberate transformation of the end-user's cognitive and/or emotional state. In a sense this offers unique and quantifiable measures of system success. However, the clarity of this depends upon explicitly stating both the aim of the system and the extent to which the system succeeds in doing achieving this aim (and how the success was measured). If, for instance, a researcher states that a system is designed to persuade users who are not exercising currently, into exercising half an hour three times a week, there is quite a clear indicator for measuring the success of the system (assuming that we are informed about the whole context of the persuasion). 81.3% (n=26) of the experimental papers reviewed stated a clear change, thus mentioning what they were trying to accomplish. This may be considered positive, as change and transformation is the core of persuasive systems; however only 71.8% (n=23) of the experimental papers actually reported whether a change or *transformation* had occurred (A2) Thus some papers stated aiming for a change, but did not state if it actually took place.

### *3.1.2 The event*

**Use context** (C3). Only 54.9% (n=28) of the 51 papers described the use context. For 19.6% (n=10) it was simply not described whereas for 25.5% (n=13) it was not applicable (papers with conceptual and theoretical content). Even with those papers that described the use context it was often described in a coarse manner. It does not seem to make much sense to simply state that one is designing a system that will resolve or relive a large and diverse user group's obesity problems. In comparison, a statement such as: "the goal was to persuade low-income school children between the age of 10 and 15 to eat at least three pieces of fruit each day" seems much sounder way to define a clearer and measurable goal, too. The issue we flag here is that the information going into a design often seems to be at too high a level and detached from an individual user. By hastily jumping from a higher abstraction level to a concrete problem solving level, it may become impossible to see what really takes place through the software system at hand as well as to what extent the change is due to the intervention. Thus, there seems to be a tendency for persuasive system researchers to describe the use context at a very general level, such as the effects of e.g. smoking or malnutrition on society in general.

**User context** (C4). Of the 51 papers 51.0% (n=26) it was not possible to determine the user context in a clear manner. Only 12 papers (23.5%) addressed the level of *actual users* and *their individual context.* For 13 papers (25.5%) the concept of User Context was not applicable (papers with conceptual and theoretical content). As with the use context most papers discussed also the user context from the higher level of society alá "heart disease is an expensive and growing problem in society". Concrete information was often limited to gender and age and in most cases readers were not supplied with enough details about the subjects' lifestyles, needs, habits, etc. As an example hereof, in most experimental papers students are seen as one homogenous mass. In most cases readers do not get much information about them other than simply stating that they are students and possibly also their age and gender. There is the danger of oversimplification here. Interestingly, we observed that *systems are often designed to persuade an individual at a system-to-user level but to resolve a user-in-society issue*. Paradoxically, it is not a 'society' that is to be persuaded, but an individual user in a society, also it is striking that the designs aimed at a system-to-user transformation are largely informed by system-in-society traits. The designers may however posses in-depth knowledge about users; however it is not clearly reflected in the dissemination. In every case, it becomes difficult if not even impossible to discuss the generalization of results unless a very clear description of the user context has been provided. For the 32 experimental papers, 46.9% (n=15) were conducted with 'diverse' subject groups, and 28.1% (n=9) were conducted with 'students'. 1 paper (3.1%) did not state user context clearly and the rest 21.9% (n=7) were more specific about their user segment e.g. elderly, teens or kids. This might not pose a big problem in a pure human-computer interaction study, where one were testing the users' cognitive skills, apparatus, or ability to perceive an interface and/or solve concrete tasks with it, but it does pose a problem when designing for persuasion. Persuasion does not

equal raw cognition of buttons, measuring hand-eye coordination or similar. We will have to accept the multidisciplinary nature of the field and observe communication studies, where researchers operate with more finely grained segments. Thus, a clearer research setting could be defined as 'obese 55-65 year old white females who have higher education' and such an application audience may be addressed very different than 'financially challenged uneducated obese teenagers'. In addition, Khaled et al. [23] point out that most research springs from an individualistic western culture as opposed to more collectivist cultures. At this point in the history of persuasive systems we do not know much about how these factors might affect technology-mediated persuasion, but we know that these things play a role in human-to-human communication and in other types of media.

**Technology context** (C5). In our review of the 32 experimental papers 14 (43.8%) were desktop, 6 OEM/Custom (18.8%), one (3.1%) mobile, and one (3.1%) ubiquitous. Three (9.4%) fall into the category of multiple technologies, and two (6.3%) papers simply do not allow for an extraction of a co concrete technological context. Five papers (15.6%) provide qualitative studies in the early phases of investigating a system to be produced at a later time. Naturally, in describing a persuasive system we need a very clear description of the technology context. In spite of the fact that many papers describe the persuasive system under investigation with several screenshots, descriptions of the flow between parts of the system and its content, it is often difficult to grasp what the system really is like. As such, the field faces a challenging task that might be somewhat unique, at least when seen from a hermeneutical perspective, as it simply is hard to communicate a user experience very clearly. One may be able to 'feel' an interface and the actual system when interacting with it, whereas one does not 'feel' the physical word set in ink on paper when one reads it. Rather we may feel the *meaning* that we interpret those words to convey – but where does this meaning reside in a persuasive system? If one subscribes to Redström's (2006) notion that persuasive system artifacts de facto have embedded arguments within them [14] and extend this view to encapsulate the rhetorical notion that an argument might be an appeal to either emotions (ethos and pathos) rather than logic (logos), we can begin to sense how complex the description of technology context can be. What, after all, caused the actual persuasion? Was it the content of a game that was persuasive, or was it the presentation layer? Was there really just one type of content? Was it the smooth interaction (the feeling of clicking and navigating and receiving feedback), or was it a mix of all of these concepts? Notably, when discussing persuasive systems we should remember that while the technology in itself is not neutral [12, 14] it is not persuasive either. An example might clarify this important point: When conveying the message that attending sports three times a week is essential for schoolchildren's health (and persuading them into changing their behavior in that direction), we could choose to implement two different systems. One could be a mobile application promoting physical activities for the children and could be an information kiosk to be deployed at schools near the canteen. Notably, only the use context and the technology context differ between these two systems. If at a later time one would then survey the utilization of these systems, one could wind-up determining that the success seems to be higher when deploying a mobile application; that does not, however, mean that the mobile applications *per se* are more persuasive than information kiosks. They may, for an instance, be more persuasive for domain-specific issues and a user group at hand; but not more persuasive as such.

### *3.1.3 Strategy*

**The message** (C6), comprising both the form and the content to cause an intended transformation, was described in 62.5% (n=20) of the 32 experimental papers. It was not described in 28.1% (n=9), and for the remaining 9.4% (n=3) it did not make sense to distinguish between these two, for instance a qualitative analysis on a topic that would affect communication and thus rather describe an aspect of content than delivering content themselves. Many of these papers were measuring the difference between two or more conditions rather than conveying a message as such.

**The route** (C7). In general we were not able to extract the route taken for persuasion. In the 28.1% (n=9), of the papers that did not offer a clear message (C6) it was naturally not possible. In papers that did have a clear message, it was not described at a granularity; where we could determine the route clearly. Typically the message is not described at such a level of detail that we can determine whether they had employed a direct approach thus accomplishing the change through a convincingly strong argument or whether they rather employed many arguments. We found that too much was left to interpretation when categorizing papers route for us to draw any real conclusions from. This is in itself a finding as it again highlights that the dissemination of persuasive system research offers added complexity. We need to know not only the message but also what *kind* of route the message takes: What types of arguments were presented? Was one or multiple arguments presented? Possibly also the types of rhetorical appeals employed (logos, ethos, pathos or a mix?). When this information is omitted, it becomes hard for readers to understand what took place and what caused the actual persuasion. Was the system e.g. manipulative or was it pure voluntary change?

## 3.2 Design Principles

Many papers used multiple ways to support the persuasion and oftentimes they used multiple techniques to do it. The most used design principles tackled in the data can be seen in Table 1.

Tailoring, tunneling, and reduction seem to be the most used ways for persuasion to support accomplishing one's primary task. On the other hand, suggestion as way to support the user-system dialogue and social comparison and normative influence as a means to provide social support seem to have received much attention in research so far. From the credibility research, surface credibility has received most of the attention so far.

| Persuasion technique | Support dimension | Frequency |
|---|---|---|
| Tailoring | Primary task | 11 |
| Social comparison | Social | 11 |
| Tunneling | Primary task | 10 |
| Reduction | Primary task | 10 |
| Suggestion | Dialogue | 9 |
| Surface credibility | System credibility | 8 |
| Normative influence | Social | 7 |
| Self-monitoring | Primary task | 6 |
| Social learning | Social | 6 |
| Praise | Dialogue | 5 |
| Liking | Dialogue | 5 |
| Simulation | Primary task | 4 |
| Reminders | Dialogue | 4 |
| Authority | System credibility | 4 |
| Recognition | Social | 4 |
| Rewards | Dialogue | 3 |
| Similarity | Dialogue | 3 |
| Trustworthiness | System credibility | 3 |
| Cooperation | Social | 3 |
| Personalization | Primary task | 2 |
| Rehearsal | Primary task | 2 |
| Social role | Dialogue | 2 |
| Expertise | System credibility | 2 |
| Real-world feel | System credibility | 2 |
| 3rd party endorsements | System credibility | 2 |
| Social facilitation | Social | 1 |
| Verifiability | System credibility | 0 |
| Competition | Social | 0 |

**Table 1.** Most used design principles in the Persuasive conferences 2006-2008.

## 3.3 Ethics

Surprisingly, ethics (A1) was hardly addressed in the data as only three of the 51 reviewed papers discussed the topic at length. None (!) of the experimental papers explicitly addressed ethical considerations. This is a severe shortcoming in the current state of art in the field. Ethics being largely unaddressed might in itself be considered unethical, if the field were to boast its concern about the ethical aspects of computer-mediated persuasion.[1] Moreover, there are some large unaddressed questions to be discussed. To begin with, does the field truly subscribe to the notion that persuasive systems should cause a *voluntary* cognitive change? If so this is unfortunately not clearly visible in the reported research. We must clearly state that designing persuasive systems undertake a new meaning in particular with regard to the ethical impact. Persuasive system designers can never assume that they are merely building software tools, for in doing so they are also deliberately conveying embedded messages with the aim of infusing a planned cognitive change in the end-users. This is only to a lesser degree the case when we design reformative systems, if for instance we build a phone system supporting speech transmission; we are not ethically responsible for one user calling another user and issuing a threat. If we however build a phone system that somehow persuades such behavior that would naturally pose severe ethical implications. Persuasive designers undertake the task of embedding deliberate messages in persuasive systems by designing the arguments that are contained within the systems [14] resulting in systems that persuade on our behalf – systems that act as our vehicle of persuasion. Therefore, to a high degree, we must assume responsibility for the ethical aspects of such designs as we embark on encouraging a certain behavior or attitude [8, 15, 16]

[1] It should be noted, however, that at Persuasive 2008 there was a panel session dedicated on ethics of persuasive technology, and at Persuasive 2007 it was raised as an issue in one of the panels.

### *3.3.1 Bias and validity*

When conducting an analysis such as described here, potential bias lies in the interpretation of the published research papers. In reviewing and categorizing, we carefully observed if the authors clearly stated the described variables. Naturally, the papers did not always employ the very same terminology as found in the PSD Model, so in many cases the analysis was based on an interpretive categorization. According to Andrew, Borriello and Fogarthy, persuasive strategies in themselves may overlap [21], which naturally also hints that interpretation in some cases might be necessary. Interpretation is always partly subjective [22]. We did run into this issue, however in most instances it was relatively easy to categorize as we employed the clearly defined elements of the framework. Theoretical papers did not necessarily describe one specific system, but rather described concepts in a more general fashion. Both papers that describe tunneling as a strategy from a theoretical perspective and papers that describe a system actually employing tunneling were noted in the tunneling category for primary task support. This ensured that the model yielded meaningful data for papers that were not founded in an experiment but still presented in-depth knowledge about a given topic.

## 4. Conclusions

This paper has provided an overview of the current state of the field of persuasive system design. The field has had a good start and it may evolve into something extraordinary but there is room for improvement in both the research topics and methods utilized. One of the main findings in this paper is that all too often there are blanks in the dissemination work itself. We believe that this is due to the inherently multidisciplinary nature of persuasive systems as well as the limited age and relative immaturity of the field. As a preliminary contribution we have attempted to devise a heuristic (included in Appendix 1) that addresses the most central issues to keep in mind in dissemination. The heuristic may serve as a starting point when embarking on dissemination work.

More is required from the systems when they are to persuade their users, but equally important more is also required from the system designers. The skill sets that a persuasive designer optimally should maintain requires expertise from multiple diverse areas; which leads to an increase in complexity. Persuasive designers will have to know about many different aspects of technology, and at the same time to understand the deliberate content as seen from the perspective of persuasive communication, i.e. rhetoric. This should be reflected in the educational programs on persuasive systems and design. One cannot be an expert in all of

these diverse areas, but it seems clear that there should be a common body of references from each of the fields stipulating their contribution to persuasive systems.

## 5. Directions for Future Research

Based on the findings we will also draw more general conclusions and provide suggestions for future research directions. The suggested themes are in no ranked order and are by no means exclusive or exhaustive. They merely stipulate some of the findings and hint at possible solutions.

**Persuasive design methods:** There will be a continuous need for research into how to *prescribe* predictable persuasive designs and also methods for a clearer measurement of successful designs. As of now, there are not many conceptual models or persuasive system design methodologies. Empirically proven models would be of great value for the field.

**Persuasive de sign patte rns:** Some modes of interaction are in themselves more persuasive than others. By properly designing options and visual feedback we may devise optimal sequences of interaction that cater more to a certain type of behavior than another, for instance, designing a set of web application screens with the aim of having people signing up to a news mail, adding more things to their shopping cart, or inviting their friends to engage in an online community. Where we in HCI might focus on how to make such task solving as easy as possible and ensuring that we have the least amount of cognitive strain, persuasive interaction design patterns caters to the users on a different level formalizing how we might get more success in persuading the user to complete such tasks.

**Software au diences:** The notion that people are both users and audience needs to be explored further and at depth. There might well be a need to target the design of systems depending on the audience that we are actually trying to persuade. If, for instance, we are to persuade young males in urban areas not to drive their cars too fast, chances are that we would need to tailor or message very clearly towards them in the persuasive system. What is special about persuading young men? It is possible to point out a set of specific target audiences that might be addressed on their own, e.g. kids, tweens, teens, young adults or the elderly. We should also note such gender and cultural differences that might play a role in persuasion.

**Scientific and theoretical concerns:** The multiple scientific areas have different epistemological traditions. This in combination with the broad nature of persuasion results in a multi-disciplinary area of investigation open to a wide array of themes as well as approaches. Regardless, we must come to terms with how we can combine engineering with a field that has a two thousand years old tradition of dealing with ontology and debating the true nature of meaning as such.

**Ethical con cerns:** The field has faced and will continue to face ethical challenges as, no doubt, many research findings from the field of persuasive systems can be abused. Ethical considerations should be more clearly addressed in the research. Unfortunately, our review revealed that so far these have been poorly addressed in the published research papers. Special attention should be given to situations where computer-mediated persuasion takes place without the user being aware of it [15]. Also, the 'grey areas' should be considered, e.g. would it be unethical to design manipulative systems that would lead elderly users into taking their heart medication in the most optimal way. In spite of potentially noble outcomes, there may be many ethical aspects to be debated. The field of persuasive system design should take upon itself also to monitor and share examples of unethical behaviors, for instance documenting unethical marketing and/or propaganda.

**Application domains:** *e-Health* as an application domain is both so large and important that it deserves special attention. Many of the health challenges faced with in the western society can only be solved by infusing humans with the motivation to make long-lasting lifestyle changes. For instance, obesity, alcoholism, internet addiction, compliance and corrective behavior technologies, social support, and digital interventions provide a multitude of interesting research questions. Designing persuasive systems that could resolve even some small parts of these problems and aid in true long-term sustainable change would provide to be very valuable. *Knowledge work and collaboration* is another area of its own that earns merit. Admittedly, this is a very challenging area. Whether to address it at a microsuasion level, i.e. in user recommendations in the form of rating, or whether to aim at designing systems that would persuade users to engage in more knowledge sharing, there is a need to investigate how humans can be persuaded into undertaking significant feats. Currently, Wikipedia is a prime example of true collective intelligence. We could also mention open source software projects, such as Linux, in which users are eagerly contributing valuable knowledge. As knowledge work and the augmentation of the human intellect by means of collective intelligence become more prevalent, there is a need to be able to design systems that may persuade users to engage in such altruistic behaviors.

## 6. REFERENCES


[1] ARISTOTLE. 350 B.C.E. Rhetoric. http://classics.mit.edu/Aristotle/rhetoric.1.i.html

[2] ENGELBART D., C. 1962 Augmenting Human Intellect: A Conceptual Framework. http://www.bootstrap.org/augdocs/friedewald030402/augmentinghumanintellect/1introduction.html

[3] SHNEIDERMAN, B. 2003. Leonoardo's Laptop - Human needs and the new computing technologies. MIT Press.

[4] DIX, A., FINLAY, J.E., ABOWD, G.D. AND BEALE, R. 2003 Human-Computer Interaction (3rd Edition).

[5] ALTER, S. 2002. Information Systems: Foundation of E-Business (4th Edition).

[6] PICARD, R.W. 1995 Affective Computing http://affect.media.mit.edu/pdfs/95.picard.pdf M.I.T Media Laboratory Perceptual Computing Section Technical Report No. 321.

[7] CARD, S., MORAN, T. AND NEWELL, A. 1983. The Psychology of Human-Computer Interaction. Lawrence Erlbaum Associates, Hillsdale, NJ.

[8] FOGG, B.J. 2003. Persuasive Technology - using Computers to Change What We Think and Do. Morgan Kaufmann Publishers, San Francisco.

[9] TORNING, K. 2008. Persuasive Technology Design - A Rhetorical Approach. Persuasive 2008, 83-93.

[10] FOSS, S., K., FOSS, K., A. AND TRAPP, R. 1985. Contemporary Perspectives on Rhetoric. Waveland Press Inc., Prospect Heights, Illinois.

[11] BITZER, L., F. 1968. The Rhetorical Situation. Philosophy and Rhetoric, 1-14.

[12] OINAS-KUKKONEN, H. AND HARJUMAA, M. 2009. Persuasive Systems Design: Key Issues, Process Model, and System Features. The Communications of the Association for Information Systems.

[13] OINAS-KUKKONEN, H. AND HARJUMAA, M. 2008. A Systematic Framework for Designing and Evaluating Persuasive Systems. Persuasive 2008, 164-176.

[14] REDSTRÖM, J. 2006. Persuasive Design: Fringes and Foundations. Persuasive 2006, 112-122.

[15] ATKINSON, B. 2006. Captology: A Critical Review. Persuasive 2006, 171-182.

[16] LETH JESPERSEN, J., ALBRECHTSLUND, A., ØHRSTRØM, M, P., HASLE, P. AND ALBRETSEN, J. 2007. Surveillance, Persuasion, and Panopticon. Persuasive 2007, 109-120.

[17] PERSUASIVE 2006. In Eindhoven, The Netherlands, May 18-19, 2006, W. IJSSELSTEIJN, Y. DE KORT, C. MIDDEN, B. EGGEN AND E. VAN DEN HOVEN, Eds. Springer - Proceedings Series: Lecture Notes in Computer Science.

[18] PERSUASIVE 2007. In Eindhoven, The Netherlands, April 26-27, 2007, Y. DE KORT, W. IJSSELSTEIJN, C. MIDDEN, B. EGGEN AND B.J. FOGG, Eds. Springer - Proceedings Series: Lecture Notes in Computer Science.

[19] PERSUASIVE 2008. In Oulu, Finland, June 4-6, 2008, H. OINAS-KUKKONEN, P. HASLE, M. HARJUMAA, K. SEGERSTÅHL AND P. ØHRSTRØM, Eds. Springer - Proceedings Series: Lecture Notes in Computer Science, .

[20] MCCALLEY, T. AND MERTENS, A. 2007. The Pet Plant: Developing an Inanimate Emotionally Interactive Tool for the Elderly. Persuasive 2007, 68-79.

[21] ANDREW, A., BORRIELLO, G. AND FOGARTY, J. 2007. Toward a Systematic Understanding of Suggestion Tactics in Persuasive Technologies. Persuasive 2007, 259-270.

[22] KVALE, S. 1996. InterViews: An introduction to qualitative research interviewing. Thousand Oaks - Sage.

[23] KHALED, R., BARR, P., NOBLE, J., FISCHER, R. AND BIDDLE, R. 2006. Our Place or Mine? Exploration into Collectivism-Focused Persuasive Technology Design. Persuasive 2006, 72-83.

## 7. Appendix 1: A heuristic for persuasive system research dissemination.

Below we offer a simple heuristic that emerged from our work with the literature review. It reflects variables that make dissemination in regards to persuasive systems clearer, as their explicit mentioning aid the reader in understanding how the persuasive system worked. In system descriptions, most of the variables can be made explicit relatively easily:

1. Persuader
    a. Who is speaking via the design? Who embedded an argument in the artifact?
    b. Why are they speaking? What is their intention or purpose?
    c. What do they stand to benefit from successful persuasion?
    d. What is their background and culture, etc.?
2. Change type
    a. What is the goal? Behavior and/or attitude change?
    b. What transformation should the software system produce?
    c. What other approaches have failed?
    d. Did the software system finally produce the desired transformation?
3. Use context
    a. Who are the users as a group, e.g. socially challenged girls 10-12 or 55 years and older?
    b. What problem-domain dependent features in the form of well-known problems are to be addressed by the design? Physical, cultural/normative, or competitive?
    c. Who (or what) else is competing for attention in this space?
4. User context
    a. What is specific for the users with regard to what they are to be persuaded of?
    b. Why is there a need for persuasion? What constrains their decision?
5. Technology context
    a. Single hardware platform or multiple?
    b. Networked or stand-alone software?
    c. Single or multiuser software, or shared collaborative?
6. Message
    a. What is the form? Why was it chosen? What is the genre, e.g. game, social community, tracking tool, ambient system, etc.?
    b. What type of content is the system providing?
    c. What kind of appeal is mostly employed? Logos, Ethos, Pathos or Mix?
    d. What kinds of arguments are being provided?
7. Route
    a. What is the approach? Direct (one dominant argument) or indirect (several arguments)?
8. Experimental papers
    a. Did the system *measure* a degree of persuasiveness between conditions or did the system *actively persuade* of something?
    b. Number of subjects
    c. Method employed
    d. Analysis of results
    e. Level of transformation
9. Ethical considerations and implications

# **Appendix 4:** Paper 4

**Title:** Using a Collaborative Workspace to share, develop and maintain “Best Practices” in a Corporate Context.
**Content:** In depth description of problems preventing the true adoption of the knowledge management system at Danfoss
**Pages:** 34

**In submission:**
Special issue on Knowledge Management in Action of the International Journal of Computer Supported Cooperative Work
http://www.uni-siegen.de/fb5/wirtschaftsinformatik/cfp.html

# Using a Collaborative Workspace to share, develop and maintain "Best Practices" in a Corporate Context

Kristian Tørning
*Department of Organization, Copenhagen Business School, Kilevej 14A, 4.,2000 Frederiksberg, Copenhagen (E-Mail: krt.ioa@cbs.dk)*

**Abstract.** This paper investigates the situation of workers who are sharing and developing knowledge at a global company. Ethnographic fieldwork was undertaken at a global industrial engineering conglomerate to investigate the work situation of workers that had to use a SharePoint® portal system to collaborate on shared "best practices." Qualitative and quantitative data were collected to analyze problems that inhibited workers from engaging in more sharing behavior, and why more sharing behavior did not occur despite rich technology offerings and investments in "best practices." The study serves to highlight concrete issues in regards to the 'first wave' of knowledge management strategy that aims to support the codification paradigm.

**Keywords:** knowledge management, knowledge management systems, case study

## 1. INTRODUCTION

Investigating the relation between humans and technologies is a central activity in CSCW research. Ideally, we strive to attain a normative capability to create designs that solve problems by matching user needs with appropriate technology solutions. This goes back to Douglas Engelbart and his work on augmenting the human intellect (Engelbart D. 1962, Bardini 2000). Today, Corporations purchase 'augmentation' software aiming to increase profits by managing information and work processes. This approach has become increasingly popular from the late nineties onwards, where a knowledge based perspective of the firm has emerged in strategic management literature (Alavi, Leidner, 2001). This perspective promises firms long-term competitive advantages by working with structured and managed 'knowledge' (Grant 1996a, Grant 1996b, von Krogh 1998, Spender, Grant 1996).

The work on 'knowledge management' refers to Polanyi's (Polanyi 1966) distinction between 'tacit' and 'explicit' knowledge. The vision entails companies facilitating an externalization of personal tacit knowledge and *converting* it into explicit organizational knowledge (Nonaka 1991, Nonaka, Takeuchi 1995, Nonaka, Konno 1998). In CSCW, this knowledge management approach has been dubbed "the stock" approach (Huysman, Wit de 2002), and for obvious reasons, it is this stance towards 'knowledge' that appeals to businesses since it not only claims that 'knowledge' can be managed, but that it can also be used strategically to increase competitiveness.

We can however question if this perspective is not inherently problematic, that is, whether 'knowledge' of a work practice can, in reality, be detached (codified and

externalized) from the practice itself. Ryle (2000, 1949) would argue that competence and ability is not a direct function of 'knowing-that.' For example, reading and understanding the individual steps in a soufflé recipe – 'knowing-that' a soufflé can be made – will not make anyone a chef. Chefs, on the other hand, 'know-how' to make a soufflé, i.e., they can *do* it (Ryle 2000, 1949). Fundamentally, we also lack a clear definition of 'knowledge'- as Alvesson and Kärreman (Alvesson, Karreman 2001) point out, the term 'knowledge' "…is an ambiguous, unspecified and a dynamic phenomenon, intrinsically related to meaning, understanding and process, and therefore difficult to manage" (p. 995). Since 'knowledge' itself, is inherently ambiguous, this affects the derived terms such as 'knowledge management', 'knowledge work' and 'knowledge workers' (Spender, Grant 1996, Grant 1996b, Nonaka 1991, Nonaka, Takeuchi 1995, Drucker 2005, Schultze 2000). Regardless of any philosophical implications, companies increasingly work with 'knowledge,' regardless of whether they have a sharp definition of it or not. Companies also purchase systems such as Lotus Notes® and SharePoint® on promises that the software can facilitate sharing, develop and manage knowledge and empower users to work more effectively.[1]

Web based intranet portal systems have become a standard technology offering in many global companies. Such systems literally affect millions of users in their daily work, which makes them especially interesting for CSCW-researchers. In 1992, Orlikowsky in her study Notes (Orlikowski 1992) described a system deployed in a large consultancy firm without any reward structure, with unclear work procedures, with internal competition and without any formal training in using the system. The result was failure, as employees did not share 'knowledge.' Ten years later Bansler and Havn (2002) describe a large initiative in the pharmaceutical industry; the authors elaborate on why, regardless of top management support, the initiative failed at facilitating more knowledge sharing. It was due to: time pressure, lack of incentives, knowledge sharing seen as "bragging" and personal networks being more important than documents and databases. In general, we have more accounts of knowledge management successes than failures, possibly due to firms seeking to bury their failures (Coakes 2004). Huysman and de Wit (2002) point out that accounts of knowledge management are often based on short-term projects. The authors also describe the need for information about downsides, suggesting ways to circumvent problems and providing information about long-term, real practice in organizations (Huysman, Wit de 2002).

The principal aim of this paper is to contribute to the body of research on CSCW-Systems centered on users working with 'knowledge' under a 'knowledge management' paradigm. The author engaged in ethnographic fieldwork to create a rich account of the context the users were in when they exhibited sharing behavior in a company that subscribed to a strategic perspective on knowledge. The motivation for the study was derived from observing concrete problems that prevented users from more actively taking part in the creation of shared practices.

[1] See appendix 1, for a few sales points made about these two products.

# 2. CASE OVERVIEW: SETTING THE SCENE

The section presents the case company X-Corp (a pseudonym); the knowledge management strategy that the management employs and the central term "best practice" is explained with an example. The roles that are involved in working with "best practice" and the CSCW-system used in their work are also described.

## 2.1 The company

X-Corp is a male dominated industrial engineering conglomerate that globally supplies components within several core areas. With more than 31,000 employees distributed globally, and having 93 factories in 25 countries and an even larger distribution network, X-Corp is truly a global company. X-Corp has seen issues with underperformance in terms of profitability compared to benchmark companies that have consistently delivered higher profits (measured in EBIT[2]). Management has identified that there are severe issues in regards to work practices. Historically, X-Corp has comprised of three divisions, each having its own distinct culture. During the past five years, acquisitions of smaller companies have further added to the diversity in work practices. Competing companies have already had success with introducing more stream lined work "best practices," for instance, using Lean production methodologies.

To address the situation, management formed X-Corp Business System (XBS). This new centralized cross-divisional department contains several programs for improving the overall performance of X-Corp as a whole, by means of introducing uniform "best practices." The main charter lies in pushing the culture at X-Corp into a more *performance driven* one. Employees must adopt a mindset of continuous improvement across all functions starting with: Manufacturing, Sales, Procurement and Product Development. As the former COO [now CEO] proposes, XBS plays a central role in ensuring the success of X-Corp:

> "The ability to continuously do things better than before needs to become a strong part of our culture. XBS will enable us to take a huge improvement step, sustain it and then take another huge step – over and over again."

Working with and improving "best practices" thus have to become an everyday routine. "Best practices" that describes how to conduct work needs to be documented, developed, updated and employed by workers in a self-sustainable way. The rationale is one of long-term survival: X-Corp simply has to change if the corporation is to survive in the global market. A production company such as X-Corp cannot maintain a role the global market without employing "best practices" when competing against companies who have already attained a competitive advantage by employing uniform and less costly business practices.

[2] "Earnings Before Interests and Taxes" – a measure of profitability eliminating regional influences allowing for comparison of companies across national borders.

## 2.2 An example of "best practice"

In CSCW, 'practice' refers to local work practice, that is, how the practitioner conducts his work (Schmidt 1991, Schmidt, Bannon 1992). At X-Corp however, "best practice" refers to the *official* centralized XBS knowledge artifacts deemed to contain the best and most valid knowledge about how daily work is optimally conducted to increase profits. X-Corp thus takes the perspective that knowledge can be externalized, codified and passed from one employee to the next with short term training. In accordance with this perspective, X-Corp management decided to get a head start by simply purchasing "best practices" for: Manufacturing, Sales, Procurement and Product Development. The vendor was an internationally renowned consultancy firm Consult-Inc (a pseudonym). Thus, first generation "best practices" at X-Corp were customized versions of the generic practices developed by Consult-Inc. Some customization took place as collaboration between XBS and consultants from Consult-Inc. The aim was to tweak the "best practices" to fit X-Corp's specific needs.

The overall core concepts embedded in the "best practices," however, come directly from Consult-Inc. An underlying assumption is that "best practices" are more or less context independent. Consult-Inc's "best practice" (e.g., for Product Development) can thus be deployed in many different companies. X-Corp management recognizes that some degree of extra customization has to take place locally to meet specific local needs. Local departments get offsite and onsite training and put through extensive change projects where they receive help in conducting work by using the new "best practice" that they are to implement as their new work practice.

One concrete example of an X-Corp "best practice" will make this concept clearer. Using the "best practice" of 'value selling,' a sales person will address the customer with an off set in the customer's specific context and use this stance to make the customer recognize the true value of X-Corp products. This practice mitigates a common pitfall for X-Corp salespeople, as they engage customers who prejudicially reject X-Corp products based on a simplified price comparison. As X-Corp delivers high quality brand components, no-name components might be far cheaper at a first glance. However, if one looks beyond a simple purchase price comparison, one will see that the competing products typically require special training to install and maintain, that they consume more energy, are less durable, and do not meet ISO standards. Employing the "best practice" of value selling, the sales person will take the customer by the hand, and make him see the larger value picture. The practice stipulates that the sales person should give each customer a guided tour of the full product value in regards to the customer's specific business. Wholesalers will not get the same tour as OEMs, as these types of customers are very different, and thus presenting products to each of these two customer types would take a very different form.

The core concept however remains the same: to visualize and sell the *whole value* of the product. The practice of 'value selling' was designed to make this mode of targeted selling easier for the individual sales person, saving him time while offering advantages in influencing the customer's decisions. The 'value selling' "practice" itself is externalized in PowerPoint presentations that explain the concept by example, in documents with more detailed concept descriptions, and spreadsheet tools that can

do the actual ROI comparison convincingly. Thus, XBS e.g., offers local sales departments a set of premade spreadsheet tools that can used to visualize compelling graphs, i.e., the total cost of ownership and ROI over a 10-year period. Notably, 'value selling' is not the most complex "best practice," since some are highly specialized and far more technical. Employees cannot do a self-study and expect to master the "best practice" since to understand the materials, the employees would need the training mentioned earlier. Some demand onsite training and assistance for several weeks implementing the practice into the local departments with constant assistance. "Best practices" are not meant to be static, as business and the world change, and thus "best practices" should adapt to the current situation.

## 2.3 Roles

In the work with the "best practices" at X-Corp., the generic roles are described in this section. There were more roles at play, but for the sake of clarity, we will focus on the three most central roles that interacted and worked with "best practices": Practice Owners, Practice Drivers and Practice Users.

### 2.3.1 Practice Owners

Practice Owners (POs) are responsible for maintaining and teaching one or more "best practices." POs also have to address shortcomings and practice change requests. POs also actively take part in concrete change projects at local departments, for instance, staying on site for several weeks assisting the local project based implementation of several "best practices." This brings local departments significantly up to speed while ensuring ample support of the large changes of daily work practice. XBS employs POs centrally, but POs spend most of their time on the road, visiting local departments, doing follow-up activities, and taking part in XBS training sessions.

### 2.3.2 Practice Drivers

Practice Drivers (PDs) are employed locally, e.g., in a country sales office in EMEA, APAC, LAM or NAM. They take part in offsite training sessions, and POs train them. Training sessions take place, for instance, in EU and last for two or three days. POs teach PDs "best practices" and help them in planning local change projects. Some PDs have to apply "best practices" locally in larger organizations and thus implement big changes to local work practice for many workers; they can participate in change projects of other PDs before having to drive their own. In general, POs prepare PDs for local change by giving them offsite training and creating "Technical Implementation Plans." These are concrete plans for driving local change, where milestones are set up with assistance from POs. Once a PD has completed his assisted change projects, he has to resume daily operations. The focus is on teaching "best practices" and adopting new ones until all local work practice has been exchanged with official XBS "best practice." This concept of POs teaching the PDs to teach local Practice Users have been dubbed: "Train the trainer." PDs also get training in

'personal skills' such as 'problem solving', 'stakeholder analysis' and 'coaching.' These "best practices" are seen as necessary for successfully implementing change locally.

### 2.3.3 Practice Users

Practice Users (PUs) are the local workforce that the PDs teach to use the practices. PUs are the main body of workers at X-Corp that have to work with "best practices." Profits are to increase as PUs apply the "best practices" and increase performance resulting in boosted profits. This is naturally dependent on actual change in how they conduct everyday work locally. PUs from multiple: sales-, purchase-, manufacturing- and innovation-teams have to change gears and work with uniform "best practices" cohering with the global strategy of continuous improvement.

### 2.3.4 An example of changing practices

XBS diffuses the new "best practices" locally by having PDs act as drivers. Typically, POs train PDs for 8-10 days in 2-3 day sessions. Training is focused on both learning the XBS "best practice" and on planning how to change things locally. Typically, the PDs select two or three "best practices" to serve as a starting point for changing practice locally. PDs choose these "best practices" based on where they expect to increase performance the most. This approach also serves to convince PUs that working with XBS "best practices" is indeed valuable and will increase profits and general performance. POs and PDs are fully aware that X-Corp is underperforming. PUs also have this information, but they might be more reluctant to accept it, especially if they are working in a department that is performing well without any XBS "best practices." As PDs return from training, they have to drive local change projects, thus infusing the practices in their local departments. During such change projects, they have PO support either onsite or remotely; for instance, when there is a need to clarify a practice or a tool, or if they need coaching. Using the "train the trainer" approach, PDs assume the role of local practice trainers in their own departments. Here the PDs are also responsible for continuous improvement by ensuring that the next set of "best practices" is infused in daily operations. The PDs are thus responsible until PUs have adopted all relevant "best practices" locally. In this manner, local work practice is sought to be shifted into the generic "best practices." PDs are also expected to contribute with ideas, issues and improvements that might surface while working with the "best practices" locally, and such findings are to be reported to the PO responsible for the given "best practice." "Best Practices" are not static; they need to be alive and evolving. Modifications and new ideas should therefore flow back to the POs from local business units, and POs should then integrate them into the official XBS "best practices," thus ensuring that findings can benefit the whole of X-Corp.

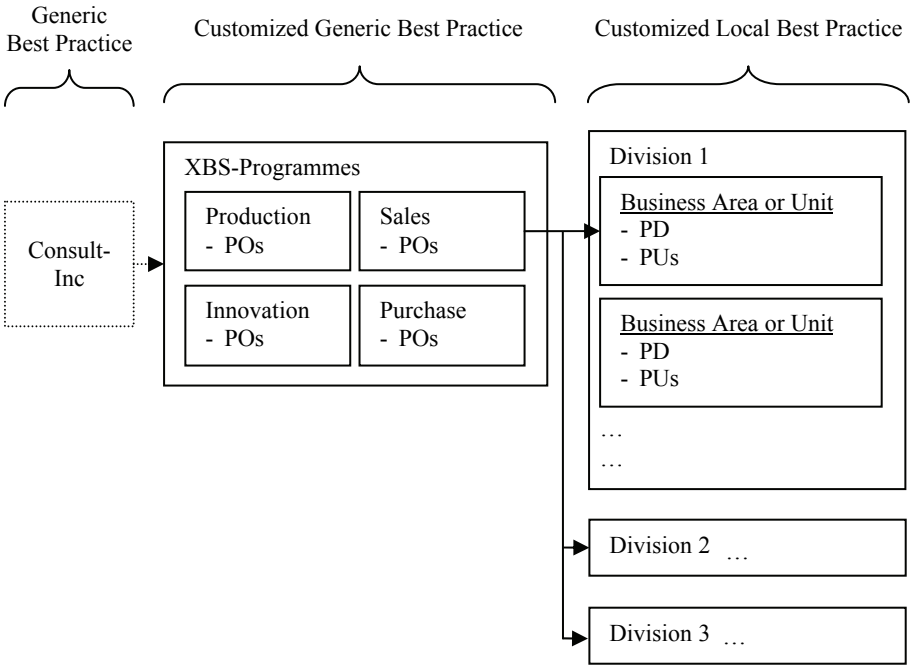



*Figure 1:* "Best practices" purchased from Consult-Inc, then customized by X-Corp and diffused into three divisions.

## 2.4 The CSCW-system for maintaining "best practices"

With well over a hundred "best practices" in the four XBS-Programs, there is a lot of content in the form of presentations, documents and spreadsheets. This content is stored in a system dubbed "The Practice Reference Guide" or in daily operations, the "PRG." X-Corp offers this system to facilitate work on "best practices" and it thus serves as the PO's, PD's and PUs intranet site for "best practices." It is a SharePoint® based system containing web pages, where "best practices" reside in document libraries. Here, content can be distributed by PO's, found by PD's and, to a lesser degree, directly by the PUs themselves. POs have to maintain their knowledge assets in SharePoint® websites updating documents, presentations and tools. If, for instance, a new case example of successful "best practice" deployment has been made, it will be published here to be seen. When a PO changes a "best practice" spreadsheet, he publishes it in the PRG in a new version. As for feedback, particularly PDs have to offer ideas and content improvements to ensure that POs can supply continuous improvement of XBS best practice. PUs are also expected to offer examples of issues that would arise in the daily work with the XBS best practices or cases of success that came from them.

Thus, the PRG has to support and result in more knowledge retrieval, sharing and creation across the many X-Corp departments.

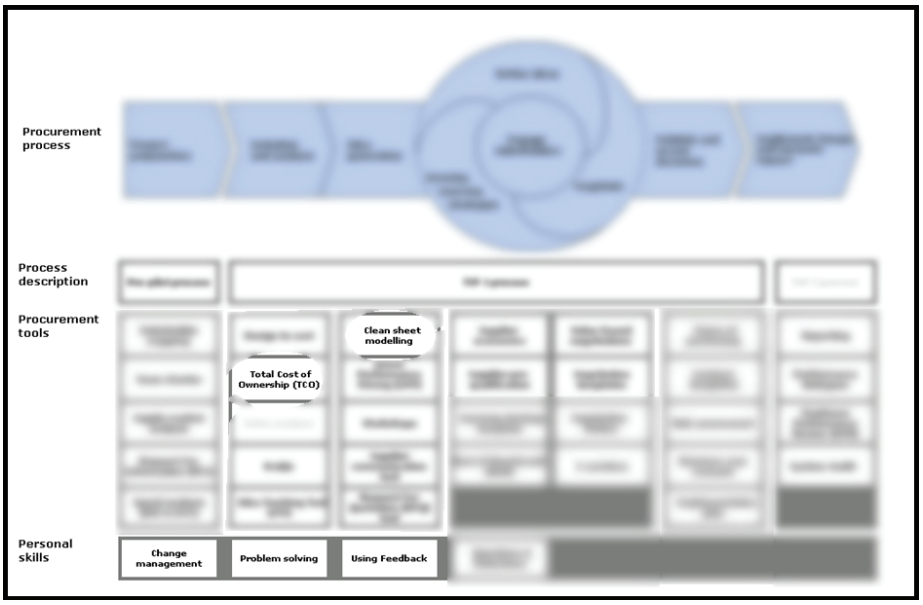



*Figure 2:* Front page of a Practice Reference Guide (business sensitive content blurred).

## 2.5 The state of play

The future envisioned by X-Corp management is that POs, PDs and PUs will develop and maintain "best practices" by forming heterogeneous communities composed of specialists from within each of the four program domains. These communities have been dubbed "communities of best practice" and should assume the responsibility of continuous practice innovation, thus ensuring fresh state-of-the-art practices based on fresh knowledge available throughout the X-Corp. Notably, they are not envisioned as organic self governing interest communities of practice, as described by Wenger (Wenger, Snyder 2000, Wenger 2004, Wenger 1998, 2008). For instance, the PUs and PDs will not appoint the leadership (the PO) of a "community of best practice" based on merits, valid contributions and knowledge. XBS will still appoint the PO, but it might be a regional purchase manager in the Ukraine, Chile or China rather than someone working for XBS centrally as most POs do today. Training will still take place, but as local departments have had their initial training and change projects, they should themselves seek to improve continuously in a self-sustainable fashion. If change can only occur with external XBS support, it will be far too costly. The management at X-Corp expects that employees will use the PRG to maintain and further develop "best practices" and methods. The four programs thus all offer "best practice" content in SharePoint® based websites. Technology will thus play a considerable role in maintaining, recreating and inventing practices.

# 3. METHOD FOR GENERATING DATA

Fieldwork was the primary source for generating empirical data. Over a three year period there were nine months spent at X-Corp. X-Corp hired me to research the knowledge sharing system and to suggest improvements to the design of the current PRG. I, the researcher, started out without prior knowledge of X-Corp products, business practices, culture or history. My role as researcher was overt and my time was split between the University and X-Corp. I had plenty of opportunities to create data. Informed ethnography was undertaken which aimed at understanding real people and their activities when operating in their natural environment (Randall, Harper & Rouncefield 2007). I took this approach openly and engaged in many different activities to submerge into the X-Corp culture. I took active part in offsite training sessions on several locations in EU, and took part in five XBS two-day quarterly meetings and the social events that followed. In quarterly meetings, XBS managers and POs discussed progress and engaged in workshops to generate ideas for solving concrete problems. In general, I had access to all employees at all levels and could book them for meetings or stop by their offices. I engaged with informants, both formally conducting interviews and informally e.g., discussing corporate news near the coffee machine or by eating lunch in the canteen. I took part in more than 80 work related meetings typically taking from one to two hours. Here I observed participants and asked questions when needed. I also worked actively with some employees solving minor assignments mainly concerning workshops and internal websites. I had access to a plethora of artifacts such as mail communication, newsletters, departmental mailing lists, SharePoint® sites, PowerPoint presentations, corporate standards, whiteboard illustrations etc. In the XBS sales program a questionnaire was administered to 256 subjects (181 replied, response rate 70.7%), and this quantitative data was later used to triangulate fieldwork findings. Towards the end of my stay at X-Corp, research activities were intensified considerably, as the last four months were spent onsite in one stretch conducting a case study (Yin 2009). The focus was to uncover what inhibited the usage of the current CSCW system for knowledge sharing and how to address the situation with design. As part of that effort, eight key informants (all PDs) were interviewed for 3-4 hours each. Part of the time spent on structured interviews and part was spent on open whiteboard sessions discussing, drawing and mapping the current situation. The PDs were chosen for the study (they had the role of driving local adoption), and they both had contact with POs and PUs. Lastly, four PDs were engaged for a whole day workshop discussing problems and possible solutions.

# 4. ANALYSIS

The analysis took place without externally imposed categories in accordance with the CSCW tradition. Findings thus emerged from reviewing the data generated (field notes, artifacts, photos, video, audio, interviews, questionnaire- and case-study data). Multiple sources of evidence were thus converged into facts (Yin 2009) by writing them into an account of the X-Corp culture, revealing consistencies and meanings

{{282 Patton, Michael, Quinn 2002}}. Triangulation also took place between the qualitative field data and the quantitative questionnaire data produced (Creswell 2003). To ensure validity, preliminary findings were shared with four PD informants in a six hour workshop, where open discussion was facilitated. This provided further insights and also served to validate issues uncovered by initial analysis.

# 5. PROBLEMS INHIBITING IMPROVEMENT

This section presents the findings that emerged from the analysis in accordance with the method for data generation; the findings are presented by taking the reader into the *culture* of the place that was under investigation (Patton 2002) (findings have been summarized in Table 1 in section 7).

## 5.1 Informal procedure for changing best practice

Given the approach taken by X-Corp and following the reasoning acquired by Consult-Inc, "best practices" needed to undergo constant rearticulating by POs, PDs and the PUs that were using them every day. The POs had to oversee this effort by anchoring and coordinating the effort of continuous change. Despite managements' repeated mentioning of the need for continuous improvement, the fieldwork uncovered that the channel for making suggestions for improvement was unclear. Each XBS program had invented its own undocumented procedure for making change requests. In whiteboard-sessions PDs were asked to map out their interactions with PUs, POs and other PDs. No two PDs could draw the same picture of how this interaction would took place, with some choosing not to draw anything at all.

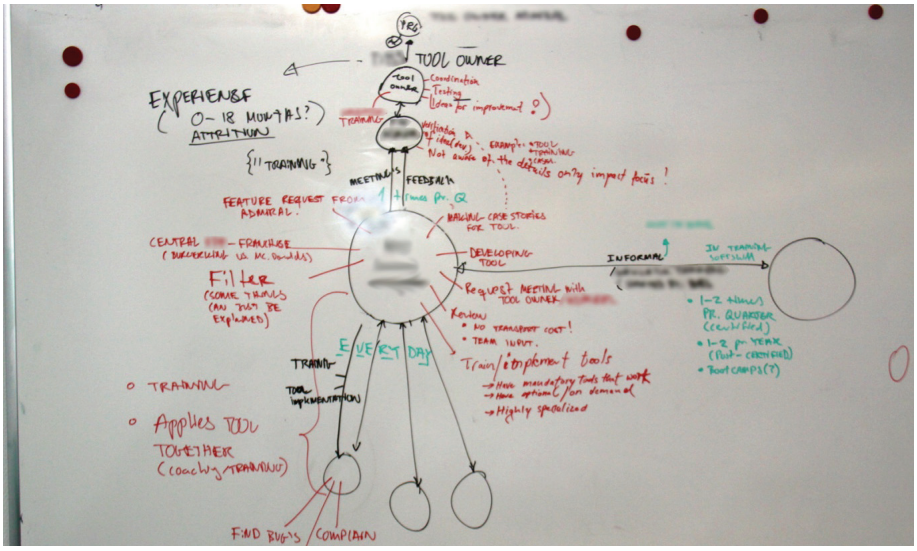



*Figure 3:* Example output of a whiteboard session (with details blurred out).

Others mapped that they were interacting directly with the POs managers rather than with the PO. Surprisingly, key XBS subjects had similar problems in clearly describing the workflow. At least, there was no uniform way to go about it. Multiple workflows coexisted, and thus a general procedure for handling improvement suggestions did not exist. No one had a written description of the official procedure for collaborating on best practices and their improvement – it did not exist. Regardless, PDs did collect ideas for improvements as they spotted problems in daily operations and the POs did get suggestions, but the follow-up procedure was informal. To make a suggestion the PDs would, for example, point out a bug in a spreadsheet tool, or file a request to add additional metrics needed locally for calculation. Nevertheless, the procedure was different for each individual PO. It depended on his or her level of engagement in maintaining the "best practice" in question. Ironically, the "best practice" for continuous improvement of the "best practices" was if not ad hoc, and at least more organic than strategic. Some POs used SharePoint® task lists, while others would let PDs file requests via mail or by phone. Consequently, requests were often invisible to other PDs and different PDs could file the same bug. In a similar fashion, both current state progress and the POs comments to such requests would normally be invisible.

Requests naturally meant extra work for the POs who were only working part time on improving practices, since they also had to engage in offsite training and local change projects. While engaged in such local projects, the POs were working under extreme time pressure. They would sometimes focus on project completion rather than transfer of knowledge in SharePoint. Off the record, some informants even mentioned that if the local project was moving too slowly, they might simply *do* some of the work which the local workforce was supposed to do, for instance, filling out a complex spreadsheet. This was faster than having the local workforce do it, but naturally did not transfer the knowledge. Locally, the PD and the PUs could not use the tool when the PO had left.

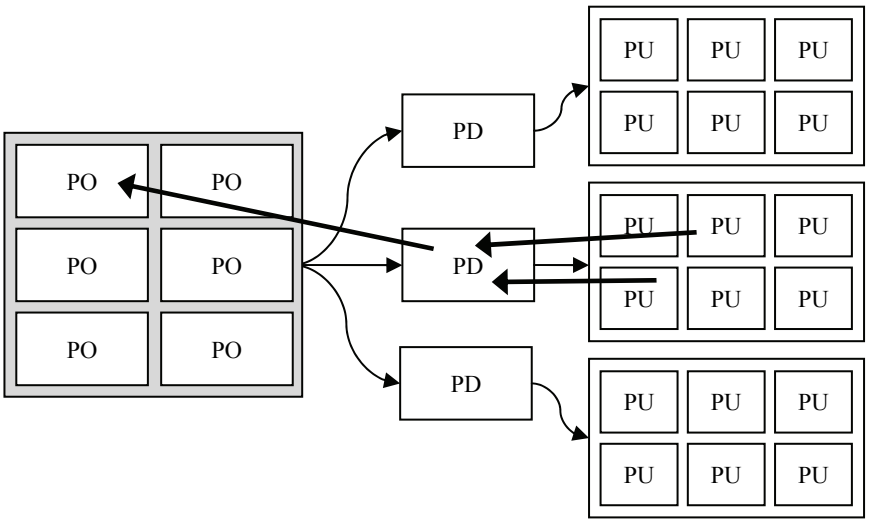



*Figure 4:* The feedback chain uncovered (here presented optimistically/conceptually).

The continuous improvement of "best practices" was thus informal, but, at the same time, very hierarchical. This had severe implications, as changes and ideas were collected from PUs by PDs and handed over to the POs. The approach was successful, as PDs would flag many issues while filtering out plenty of PU issues, which was sometimes justified. Paradoxically, the PUs that worked daily with both local practice and XBS "best practice" and who were also the experts in both had no direct voice in this setup. The POs would have quarterly "housekeeping" sessions and align via mail on changes that PDs had filed. In such meetings, POs simply focused on determining what to fix and what to ignore as known bugs. The POs were pressed for time in debating such issues and there were clearly far more requests than POs could handle – it was triage.

This approach to changing "practice" had side effects, for example, one PU interviewed initially did not know whom to contact with change suggestions. Probed further, he mentioned the local PD, but he also revealed that no one had prompted him to supply feedback in a structured fashion. It was not routine and hence not part of the daily work. He was, however, able to exhibit two highly relevant improvements, which he had implemented in his own version of official XBS purchase tools. Each modification was relatively small but was clearly generic. He was working in a cross-functional purchasing, and had to speak to both production (PUs) and product development (PUs) and align with them. A tedious part of his job was to negotiate and reach agreement, e.g., on which raw materials to choose. Choosing a cheaper raw material could affect the total price of a product considerably, and from the purchaser's perspective, it might be attractive. Such discussion could also be lengthy, as people in production might prefer to work with higher-grade metal rather than with a cheaper alloy, while product designers might have a different set of preferences based on different arguments.

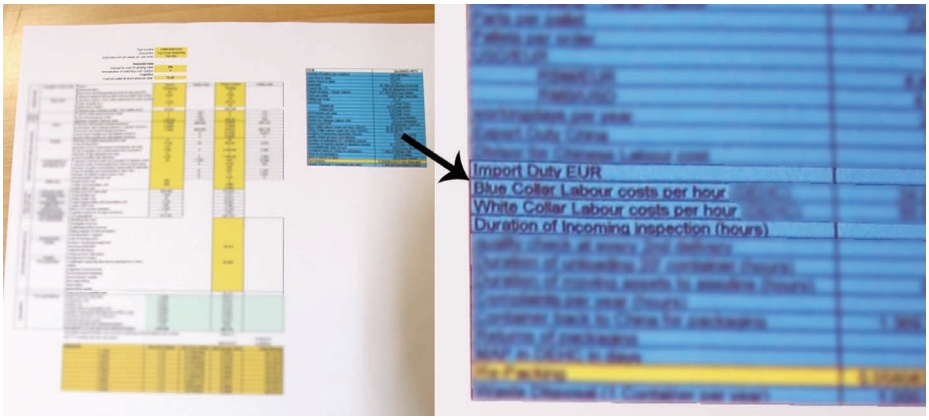



*Figure 5:* Above to the left the official X-Corp. spreadsheet (blurred) with a customization in the form of a blue box.

The PU had found that discussing such issues with production and product development led to never ending debates. There was a considerable time loss in such meetings, and participants would often distort the foundations of the decision. The

PU's solution for mitigating this issue was efficient and elegant: He had added sources of all various cost estimates involved in the decision, which would go into the calculation of the prices. This was a local modification of an official practice tool (excel spreadsheet); in this manner, the PU could mitigate the trivial but reoccurring problem that various stakeholders would challenge the cost calculations that were to serve as the foundation of the decision. Using the modification, he could point to the source of the estimate or change the result real time, if this was justified. This made the process of reaching a decision easier and more transparent.

As the interview progressed, the PU showed another valuable customization, which he had made to his own tools. Again, it soon became clear, that other purchasers would also be able to benefit considerably from this change. The PU had found that the exchange rate could affect the overall purchase price considerably, and thus he added an additional pane to his official "best practice" spreadsheet tool, taking the exchange rate into account when estimating the real cost. One can only speculate how many such ideas and improvements that lived locally and never made it to a PO would be approved.

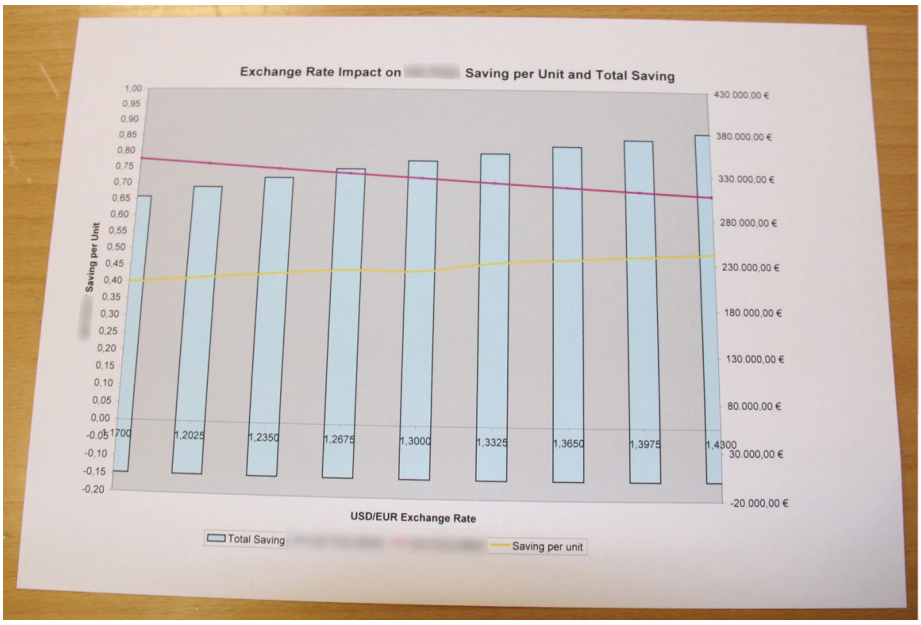



*Figure 6:* A pane added to calculate the effect of exchange rate on purchase price.

At the other end of the feedback chain, the PO perspective on changing practices was quite different. The POs' primary concern was to disallow non-'generic' customizations. The view was that local departments would have to endure some level of local discomfort that was for the general benefit of X-Corp. A very dedicated PO could exhibit a tremendously structured overview of a manual versioning of a specific tool for calculating the business potential of an innovation. He maintained it locally on his computer and kept a very fine-grained change record in a large Excel sheet. He

was very sensitive towards any quick-changes that PDs or PUs might suggest, and described it clearly from the PO perspective. The tool he was managing was a generic business case tool, the object of which was to enable companywide comparisons of the potential profitability of innovations. This was only possible if all local departments used the same tool and thus the same metrics to calculate the innovations potential. In the POs' opinion, the underlying problem was that, if a local PD or PU found a limitation in an Excel tool, they would be inclined to change it for *their own personal context*. He went on to explain that in his opinion, most X-Corp employees would rather do a "quick win" and benefit themselves in their own context, than endure additional complexity and trouble by adhering to corporate standards. He emphasized that especially many of the "younger guys" would like to change tools every time they came across a problem. He was able to bolster his account, by showing examples of mail correspondence, including a response where he effectively blocked such behavior by denying a change request.

In interacting with PDs, who had to ensure the diffusion of changes and collect suggestions for improvements, an interesting finding was that the POs which were supposed to maintain a birds' eye view perspective of official XBS "best practice" typically had the PO job function for a shorter time than the PDs had their role working locally. In a workshop, a PD took to the white board and vividly explained that seen from a long-term perspective, the content of the "best practices" was in constant flux, regardless of the Pos' efforts to keep them more static. He argued that the flux occurred due to POs typically only working as POs for 3-18 months. He expressed the opinion that new POs would assume responsibility of a "best practice" and often change it, without the proper level of domain knowledge. This would result in new POs repeatedly making the same mistakes, at the expense of the local PDs and PUs. Instead of truly consolidating a lower complexity (85-90%) solution based on proven experience from local work practice, new POs would add complexity for the sake of a *theoretical* advantage, at the expense of pushing complexity towards 99%.

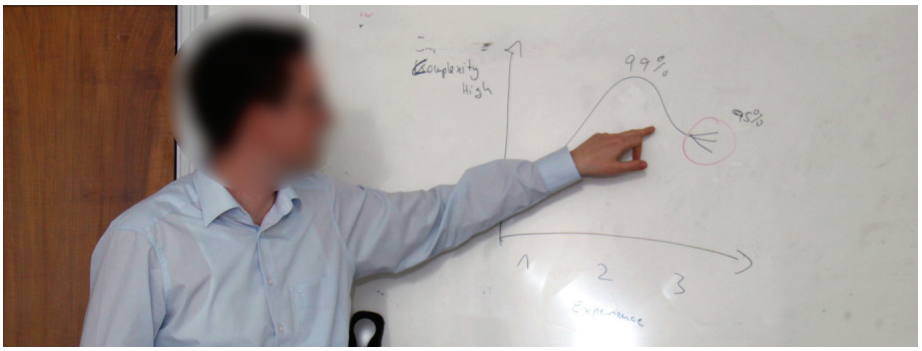



*Figure 7:* A PD explains how best practices are always in flux.

Other unwanted side effects of the informal procedure would also occur, since handovers between POs took place on a seemingly ad hoc basis, as POs left for other positions. Often, new POs would not delete old files in the PRG SharePoint® sites, as they did not know what the files were or if they had any users, thus old files

accumulated. This level of informal handling of (what should be) business critical "best practices" had a big impact on the PDs that would arrive at messy websites. Again, it depended on whether the POs kept their websites tidy, and thus sites showed great individual differences. One PD spoke openly of problems in determining, who the file owner was:

> "I think we need a single page with the most important information: Who to contact, who created this document? When was it created or modified and what is the content of it? It would be an excellent point if you, when you press it or have your mouse over it, it would show five lines with the most important parts and after you have all that, you decide to go to the next line, instead of opening it. It takes ages – ages to open it, because we are talking about big PowerPoints."

Another PD could tell about the frustration that stemmed directly from the informal procedure for changing practices. She had encountered an unplanned "best practice" change in the XBS-Portal that a PO had implemented without any notification. This was especially unfortunate, as she in her role as PD had booked a local PU for training. She had spent some time "selling" the idea that this one "best practice" would conveniently solve a specific problem, which often was her strategy to get PUs to accept the XBS tools. The day that she sat down to actually train the PU in using the tool, the XBS materials had been changed without any change record. It had been impossible for her to tell whether it was a large or small change. Her only option had been to retreat and tell the PU that they would have to look at it later. She expressed great frustration and she felt that the situation reflected very poorly on her.

## 5.2 Content complexity and quality

The complexity of content and general language barriers brought problems along two lines. While some "best practices" in themselves were difficult to understand even for the PDs that were getting training, PDs would state that it was sometimes near to impossible to explain it to the PUs, which might have worked locally by employing other terms for the same concepts that had been in use for a long time.

This problem was evident as multitudes of generic acronyms and management terms that were adopted from Consult-Inc. XBS had even taken the effort to create an online dictionary for the many new terms, which had been adopted by X-Corp, but it was not used as a consistent reference point and had not been kept updated. While the idea of introducing a companywide uniform language was sound since it would clearly reduce complexity between departments and aid in communication between HQ and local departments, it was also very ambitious to have people adopt large changes in daily operations while introducing a new language. Regardless, the approach of using and inventing somewhat action-laden management terms had spread, and new terms seemingly arrived ad infinitum as XBS POs and program leaders were themselves developing new ones. Inventors, however, did not document

new terms very well, and thus terms could be used without necessarily having one well-defined meaning.


*Figure 8:* Photos from the "New Words"-wall at the Development Program.

At a deeper level, there was another serious issue, namely with the official business language at X-Corp. At X-Corp, English was the official language, but during fieldwork, it became clear that not all employees spoke English at the negotiation level. In France, Spain, Germany end Eastern EU many employees still experienced a persisting language barrier. Typically, POs and PDs could speak English well, but the PUs that might have to use the English materials that were on offer had real problems. The XBS strategy was then to translate the already complex management terms into, for example, Polish. The cost of this translation was unforeseen and the solution chosen was to have local managers pay for it; needless to say, some local departments found the content less and less interesting.

In reality, "best practice" tools were *software.* They were referred to as 'tools,' and were advanced spreadsheets made with embedded formulas that would handle data that users typed in. Many different types of metrics were calculated in this manner in all four programs. Filling out all the data in such a tool could be a large task, where the user had to supply numerous parameters that would make the basis for a calculation. The POs that maintained these software tools did, however, not have a background in software development or any training in usability. As a result, tools were made very differently, both in regards to internal logic and in regards to look and feel. Maintaining these tools, was indeed comparable to releasing software, but here the process was informal and depended on the individual PO. Some POs did it without uniform version control or change logs. As for the concrete quality of the "best practices" tools, a very critical PD in a meeting bluntly asked: "If all the tools are equally low quality, where do you begin? You cannot criticize all of them." He described that he could not bombard the POs with the request to change all, but from his perspective, there was a need to start over, and that he would need to take as much as a whole year off to redesign the "best practices" and the tools. He mentioned that the financial crisis might present an opportunity to do so, as business was slow anyway. Another PD exhibited an impressive meta-documentation that he had made by assuming the role of translator between local PUs and the POs. While leaving the

concepts of “best practices” intact, the PD had simply redesigned most of the example content to fit the local work context, which his PUs were in. His rationale for doing so was sound, as he explained that the centrally provided XBS materials had led to significant confusion when he was training his PUs. For example, PUs had been very confused by out-of-domain examples. Consult-Inc slides were generic and used generic content to exemplify concepts, and thus slides might present a concept, using spring mattress production as an example, but this was not the business domain of X-Corp and PUs did not identify this with their daily work. As some local PUs already had concerns in changing the mode of work and understanding the concept of continuous improvement, they were presented in a foreign language with out-of-domain examples. This made it hard for the PD to sell the idea of change locally. As a result, several PDs could show the centrally made XBS homepage for practices that were maintained by the XBS POs, and then showed their own local sites containing the local practices customized by PDs. Notably, changes in the XBS Practice did not necessarily ??reflect the local homepages, as there was no backend integration of the sites. In one of these local homepages, slide materials even included an explanation of central XBS knowledge repository, where a screenshot of the XBS homepage marked out with red circles which of the many practices were relevant.

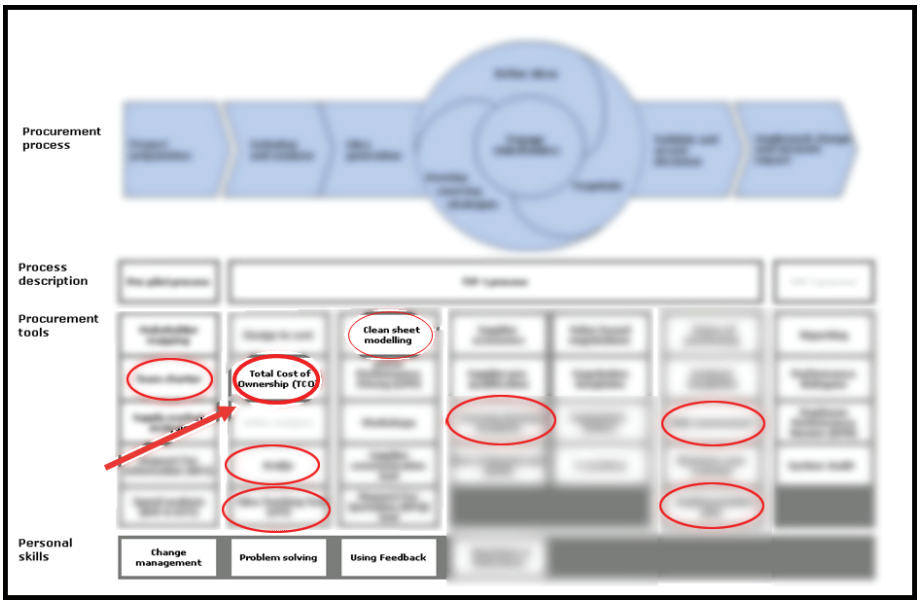



*Figure 9:* Local documentation of XBS Website version of Figure 2.

Quality issues with the “best practice“ content were very concrete and sometimes embarrassing for the PDs; after all, they had to stand up in front of colleagues and persuade them to adopt the new “best practices” as the new local work practice. Two days after a structured interview, a discouraged subject phoned this researcher after normal working hours. He explained that the tool he had made was now the official tool approved by the PO, but that while the tenth XBS change project was taking

place locally with new PDs somewhere in the EU, there were still easily identifiable surface bugs in the Excel tools. In describing this, he became quite agitated:

> "Nobody recognizes it but me, so they [the XBS POs] haven't used it [the tool] themselves, as to actually recognize the mistake, it should have been detected by someone else but me. There were some issues with another tool in China last week. I came back with several things. The users hate it, because it does not give them what they want."

He would later forward mail correspondence supporting this statement i.e., Chinese localization issues and bugs in tools. It was clear that the issue would cause problems for many PUs. Later, the subject's name came up when a third party mentioned it in an XBS meeting. The POs XBS coordinator then hinted that there was something "wrong" with the subject asking: "Doesn't he have something better to do?" with the intonation revealing irritation. Assuming an ignorant posture, I took the opportunity to poll her about what was "wrong" with him. She went on to explain that the subject always pointed out faults in the "best practices." When asked if there were indeed bugs in the tools, she mentioned that some people were always complaining about the tools, and now it was time to move on, and just use the tools that was there. Notably, the XBS PO coordinator did not have to work with the tools.

## 5.3 Computer literacy

A theme that strongly emerged in converging observations was computer literacy. Computer literacy was a significant problem for PUs, PDs, POs and the XBS management. The term 'computer literacy' is used loosely here to cover both the ability to use personal computers, as well as having a realistic understanding of computer systems.

Users at X-Corp could use the Office package of Word, PowerPoint, Excel and the Outlook mail daily. The desktop metaphor and WIMP-interaction paradigm did not pose that many problems, but SharePoint® did, as it does not offer a similar clear metaphor. SharePoint® offers a web interface to remote document libraries, with added functionality such as versioning of documents, concurrency control and "web parts" (e.g., discussion forums, picture libraries or HTML containers) that users can add to web pages. SharePoint® integrates closely with Microsoft Office and users can browse to a file on an intranet webpage and then lock it for editing so that others can open the original. They can then edit it by using Microsoft Word and later submitting the changes made. Users can also create a document, e.g., in Microsoft Word, and save it directly to the SharePoint® server, where other users can then see it in a shared document library.

In onsite observations, many users exhibited cognitive problems in regards to understanding, i.e., what it means to save files on a remote server via a web interface. It was problematic for them to understand the concept of a server and the difference between saving a file to a personal desktop document folder or to a personal or public SharePoint® document library. One can argue that in corporations, personal document

folders (for backup reasons) also reside on a remote server. This, however, took the well known form of an ordinary folder icon on a desktop, where users saved documents and created folders. It was easier for them to understand that this was indeed private, than it was to understand the private document library on the SharePoint® server, where documents would be listed in a web browser.

Despite choosing SharePoint® as the platform for working with practices, the vast majority of SharePoint® users at X-Corp never had any formal training in using it; in addition; they were not proficient at working under a web paradigm. In a questionnaire survey given to PDs working with the XBS sales program (256 subjects, 181 replied, response rate 70.7%), the users were polled: "How often do you use social software such as blogs, wikis and community sites (for instance facebook.com, myspace.com, orkut.com, linkedin.com or similar)?" 56% of the subjects replied "never" and 18% of the subjects replied "Less than once a month." When polled if they produced content on the internet, for instance in debate forums by blogging, commenting on news articles, or by rating products from commercial sites, 66% responded "no." Regardless of this Internet proficiency level, X-Corp. management assumed that users were able to use SharePoint® without formal training. As a result, workers who were unfamiliar with working online and who were collaborating on content production and communicating via Internet pages had to learn to use the system on their own, either by means of trial and error or by getting whatever support they could from nearby colleagues.

Other computer literacy issues were of a more practical nature and regarded the usage of the technology. A concrete issue that was *repeatedly* encountered was direct linking to very bulky static documents, rather than making content itself available directly online. Most content was in files embedded in homepages and not presented in HTML to see in a browser. Consequently, when arriving at a webpage with news about a department, the actual news was in a file rather than shown as content on the webpage itself. To read any content, users always had to invoke another software client, for instance, to receive mail, by clicking a link to a homepage (invoking browser client) finding the content link, and then clicking the link to content (invoking Word or Adobe Acrobat). Since, the same invoke-a-client approach dominated the XBS PRG pages, the users could not tell the content of a file without downloading it and opening it. This especially caused problems for people working on slow connections. An APAC PO explained that it was horrible for PUs that the content was "hidden." In the worst case, they could download a 40 MB PowerPoint on their slow connection, only to find that the presentation, with plenty of high resolution pictures embedded, was the wrong one… Another informant working in Chile made similar statements and so did European sales people that sometimes had to work using hotel-grade Internet connections. For the XBS "best practice" content, this issue sometimes resulted in a severe counter reaction, as both PDs and PUs would simply download all the SharePoint® content that they could while on a fast connection, thus creating their own local backup of all the "best practice" content. Here they could easily and quickly access content, but it was devastating for the concept of continuous improvement, since new updates residing in the SharePoint® sites were missed, as some PDs worked from their local version and not the latest XBS versions. From the perspective of continuous improvement, the problem was significant, and some users would even modify the downloaded content in essence

'branching' the "best practices" on their local hard drive. In modifying Excel sheets to meet their specific needs, they also made it harder for themselves to update later, and were thus even less motivated to do so, as it would mean re-implementing their customization of the new version of the official XBS-tools. The whole strategy of using SharePoint® to ensure that all users had access to the latest files was thus undermined.

Ciborra (2000) purports that studies about groupware often uncover missing leadership and that technology is drifting, as if out of control (Ciborra 2000); at X-Corp this was true, at least for the application of SharePoint. For a large part, this was due to computer literacy issues uncovered with XBS managers. They simply had an unrealistic view of what XBS could accomplish in SharePoint® with only minimal resources. They clearly underestimated the resources needed for running multiple PRG's, which led to a very organic use of technology. XBS had only hired one full time employee to work on the XBS solution and to service all the POs and PDs that included well over 800 users, not counting the PUs. This person was in essence a super-user, but could not make any customizations to code without engaging the IT-Department. Surprisingly, management expected this one person to cover the SharePoint® needs for all four XBS programs and their over 100 "best practices." There were insufficient resources to cover the global enterprise and to bridge the local and central gaps. Her tasks spanned anything from helping PDs to assign user permissions to helping entire XBS programs in designing new information architecture. This researcher sat in meetings with the person responsible for the XBS PRGs, where it was revealed that neither the XBS POs nor their managers had an even rudimentary understanding of IT development. For instance, one manager in speaking of customizing a few SharePoint® pages said: "This is not going to be another SAP project is it…?" referring to a recently completed global SAP project that had been more costly and time consuming than expected. More than once, this researcher witnessed XBS staff bombarding the PRG responsible with loose ideas, sensing that they urgently needed implementation, but were reluctant to take the time to make their suggestions in writing, concretely specifying exactly what they wanted. The XBS staff in general revealed that they did not have a basic understanding of the procedures that tied into making even a smaller change in an enterprise SharePoint® setup. They did not take it very seriously, nor did they find it attractive to learn about it.

The shortage of XBS IT resources had the implication that POs had to implement most of the "best practice" SharePoint® website design themselves, and, as a result, no two sites were the same, despite their serving roughly the same function. This affected user experience in the sense that PDs and PUs (or other POs) could not depend on the same logic being used from one site to the next. The same was the case locally, where PDs had to build local sites. This type of site design was not trivial - as PDs, they had to integrate their local practice-sites with the official "best practice" sites. This job was suited for an experienced web designer or a SharePoint® super user, but as mentioned, neither POs nor PDs had any training in SharePoint. One concrete example of the design complication was evident with a young middle manager. In a meeting, she showed her local-site on a projector and explained how she had integrated the local-site with the official XBS site. Faced with the task of linking from her own site to the XBS site, and not knowing anything about web site

design, SharePoint® or HTML, she had made the link the only way she knew how: pasting the URL directly into Word, so it automatically converted into a hyperlink. She had then uploaded the word document (containing only the link) into the document library naming it "Link to XBS PRG." To go from the local site to the XBS "best practice" site, her users had to click several levels down into a document library. Then they had to click a link to the embedded word document. They then had to open up the document by invoking Microsoft Word. The system would then issue a standard warning about the possibility of malicious content (despite the document residing on the corporate domain). Users then had to click the link in the Word document while holding down the control key, which would invoke a browser window and load the XBS "Best Practice"-site – needless to say, a complicated procedure.

## 5.4 IT: Development and configuration

The X-Corp IT-Department clearly had a bad reputation at XBS. People would often roll their eyes when speaking of IT. It never became clear whether the IT department was actually to blame for the underlying issues of various IT problems or perhaps a matter of lack of resources to deliver the service that the XBS users expected. X-Corp operated with an internal "vendor" and "customer" model where the customers might be an X-Corp department and the vendor was X-Corp IT, but the metaphor was not accurate, as the "vendor" was the only vendor.

IT was measured mainly on their ability to deliver IT at a low seating cost, and thus IT clearly aimed at avoiding changes and customization. They had successfully set up a complicated procedure for even minor customization of SharePoint® features (e.g., for the XBS PRGs). When queried, a member of IT explained why they were reluctant to implement changes; his explanation was that IT had suffered from bad experiences with a previous SharePoint® upgrade. Previously, many departments had done their own development i.e., buying components or developing their own in collaboration with external vendors, but many applications had failed, and then SharePoint® was later upgraded. This had led to the IT department losing a lot of time doing fixes on old and poorly designed solutions. Developers however found this type of work boring, as they liked developing new features rather than repairing old solutions. In another meeting, a senior IT consultant explained that the IT also had the strategy of avoiding "best of breed vendors" with reference to the issues that could arise from having a patchwork of multiple smaller applications, each of the "best of breed" at solving one particular task. When seen from a larger maintenance and robustness perspective, those types of applications were difficult to work with, as they had different types of documentation, different procedures for updating and, more importantly, they might interfere with each other when installed in a globally distributed environment.

The single worst example of how this "Don't touch anything" approach affected the wider CSCW environment was that of the malfunctioning intranet search engine. This researcher asked several users about searching and they bluntly stated that the search engine "was broken." The problem was twofold: First, there was no clear owner of the problem: it was simply unclear who was responsible for the intranet and the search engine since no one had assumed ownership of it. Second, IT did not want

to change anything and thus ran the SharePoint® search engine out of the box, without customizations or additional components. This was in accordance with the service level agreement they had with Microsoft. If they customized things "under the hood", they would have to pay more for support. When testing searching with common queries it failed to return usable results. In a meeting with members of the IT department, the issue was then raised. The response was at first stern denial. One IT employee simply stated that it was actually working. I, as the researcher, challenged this view, as I had just given a PowerPoint presentation and could open up a browser on the projector and demonstrate that searching for "travel," "order plane ticket" and "plane ticket" did not return any usable results on how to book a travel or whom to contact for travel advice, insurance or policies. The IT employee then simply uttered that people were not storing their documents in the "proper" manner. If only users supplied meta-data, when uploading documents, the matter would be resolved. When pointing out that Internet search engines seemingly demand less of users, the room temperature virtually dropped. It provoked yet another explanation, namely, that the search engine was not configured properly and that no one wanted to pay for a "whole search engine project." The root cause, it seemed, was that it did not make sense to assume responsibility for searches. The consequence was that all X-Corp users were deprived of the greatest information revolution in our millennia. In an interview, one PD offered an account of one example of how this influenced her work:

> "Sometimes it is extremely difficult to open 30 documents in order to find, what you want. Once I went in there [in the PRG] and found something that was very interesting and by mistake - or I forget -or I did not have the time – I did not save it. I do not think it makes sense for me to save it. I will have 100 things on my desktop and maybe its updated sometime in the future and I will not beneficiate from that update, so off cause I did not save it. Then when I went in there [in the PRG] a second time, I at least opened 30 documents in order to find it again. Because I did not remember where it was, I knew it was somewhere, it might be in the value selling in the case stories, but you need to open all the documents."

During the three years that this researcher spent at X-Corp, intranet searches never worked. This was the case for all users. A speculation is that top management either did not use the intranet much themselves or alternatively, they did not find search capabilities important.

## 5.5 Organizational complexity

A general issue uncovered was that of organizational complexity. While the organizational chart on the intranet was a clean hierarchy, in daily operations, the organization was far less opaque. As a matrix organization, X-Corp had issues with dual authority (Galbraith 1971). This had an impact on some PDs, as they experienced multiple direction settings. In essence, POs and PDs could experience that their change projects did not have the true support of local middle management. Thus, in a

local department where a "best practice" was being implemented, the PDs might suffer from the local manager's attitude that it was not important. On one occasion, a PO reported this directly in an XBS quarterly meeting. As a result, several POs explicitly asked top X-Corp management for a more direct and authoritarian management approach towards change in the local departments. One PO challenged the Chief Operations Officer (COO) in a plenary session, arguing that the COO should dictate the proper mode of work, for instance, by ensuring that purchase orders were only purchase orders, if done in the "best practice" purchase order template. The PO described that in his experience, the deployment of the "best practice" of using uniform Purchase orders had only succeeded in local departments where the local managers had made such a decree. The COO did not want to make a general decree for the entire corporation. He insisted that while the approach might seem tempting, it would demand top level managers to be continuously engaged in operations, and that a preferable solution would be for workers to actually feel that the practices added value. Management referred to this strategy as "pull" rather than "push." Top management found it unfeasible that they would simply decree change. In the end, PDs and POs had a hard time with local management when there was no "pull."

In other situations, it was hard to determine who the stakeholders in a given situation were. One informant explained that the organization was so complex that this in itself often prevented change. At one point, she had to align with 20 people to make a decision, working in a cross-domain area, but after restructuring had taken place to simplify the organization, she had to align with 22 people to reach a decision! Making fast decisions under such conditions was naturally impossible, and the process of reaching an agreement itself was very time consuming. The same informant explained that whenever X-Corp worked with external consultants, they always pointed at this 'complexity' and would advise that X-Corp should simplify its structure. Later, in a different conversation, the same informant explained why it in her opinion could not take place, regardless of the clear rationale in simplifying the organization:

> "I have this from an undisclosed source, I was presented with the notion that X-Corp does not have a performance culture, X-Corp has a loyalty culture. Where the Performance culture would be to prioritize, what's best for the business and make choices based on that, at X-Corp we take care of each other"
>
> [*...so it's an old boys' network?*]
>
> "When you take these people and put them in a room to restructure, they take care of each other, they are not going to leave the room having fired a friend that has been at X-Corp for more than 20 years…"

## 5.6 Who's "best practice"?

In speaking of "best practices," organizations naturally imply that other practices might be inferior, at least they are not the "best." This raises questions as to how it is

determined, that it is "best" – and from which perspective? At X-Corp, this question lurked beneath the surface, and the strategy that "best practices" was generic and could be purchased from Consult-Inc and deployed with some customizations had many side effects. As seen from previous sections, local departments did not necessarily embrace the official "best practices" offered by XBS as great solutions for local work problems. They wanted tailoring for their own specific local needs, arguing that true knowledge of, for example purchasing, resided with the people actually doing the purchasing on a daily basis.

In a XBS quarterly meeting, a local sales manager gave a presentation regarding the centrally developed practices and their complexity. XBS had invited him to speak about local progress in adopting sales practices. At one point in the presentation, he bluntly stated that there were far too many and far too complex practices for daily work. While showing a slide with the title "Have we created a Monster?" accompanied with a picture of monster, he requested that XBS begin by refining just a few and simple usable tools that could be accepted locally. He argued that there was some sort of disconnection between local work practice and the "best practice" approach taken by XBS centrally.


*Figure 10:* Above a divisional sales manager bluntly asks, "Have we created a monster?"

In speaking of local issues in regards to adopting "best practices," a PD-informant explained that in his view, the main inhibitor from gaining local adoption was the lack of documented X-Corp success cases. There was a lack of proven performance, and thus in asking PUs to change their mode of work, it was hard to point towards the success of the "best practices" in an X-Corp context. The PD then went on to explain that the centralized tools and practices were all very nice concepts, but that he needed *proof* that those practices had worked at X-Corp in order to have PUs truly accept them. This issue also surfaced in the XBS sales program survey when two sales people directly asked for a clearer connection to real-life:

> "Real-life business cases are more enjoyable and inspiring to read, than theory and the process approach. But it's always good to mention that the business case (success) has been based on the use of a certain process that can be found in the PRG."

– and:

> "Each success story should have a place on an intranet site offering the contacts to the one who achieved the story, so that we can have a direct discussion regarding the way to the success."

As the above quotes indicate, there was a need of reassurance that "best practice" was indeed "best practice" in regards to performance. Again, using sales as an example, there were not that many X-Corp business cases demonstrating success despite the XBS Sales program having run for almost 4 years.

## 5.7 No incentives for "The people that have to do the typing"

XBS managers and top level managers openly spoke of a performance culture. In a XBS quarterly meeting, the CFO explained that they would change the bonus agreements so that starting with leaders, X-Corp would begin differentiating more. Thus, a manager that had really performed and made a difference might get a 15% or even 20% bonus, while other managers that could not exhibit impact would have to settle for as little as 3-5%. The CFO explained that this logic would also be applied to the lower levels of the organization at a later time. Until this point, everybody had roughly received the same bonus. It was never clear what level of bonus the POs or PDs received. Employees did not discuss bonuses and salaries openly, and thus "performance" seemed to be another action laden management term which did not have an official definition.

In meetings, the phrase "What's in it for me" was often uttered in speaking of what benefits the PUs would have for shifting their work practice into "best practice." The "What's in it for me" question was almost canonical, and POs and PDs as well as other XBS-Staff knew that it was a core issue. One one PO spoke openly about his general experiences with internal development of software at X-Corp. He explained that it always came off as a good idea, but whenever he had heard enough he would ask, how does it make sense for *the people that have to do the typing?* He explained that this was where the great ideas would always fail: They could never supply any real value proposition for the people that typed – only extra work.

As for incentives, continuous improvement of "best practices" X-Corp was not rewarded with bonuses. In the survey administered to the XBS sales program, the recipients were asked to rate the statement: "In the past year I have received a monetary reward for contributing with knowledge or improving a business practice at X-Corp" on a 7-point Likert scale. 79% responded that they had *never* received a monetary reward for improvement. Meanwhile, local results and performance were in reality audited by looking at profits, and Local Managers' salaries and bonuses were a function of profits, not on the adoption ratio or measured performance of the official

"best practice" practices. The result was that most workers simply did what their local managers, who were paying their salary, told them to do. It is naturally impossible to shift the fundamental work practice of an entire local department without at least a periodic drop in profits. While XBS recognized that it was part of training, XBS did not address it in a manner that would resolve the issue. Thus, XBS still measured local performance by observing the level of profits generated.

## 6. A NOTE ON DOMAIN DIFFERENCES: PRODUCTION VERSUS SALES, PROCUREMENT AND INNOVATION

The effect of change resulting from "best practice" deployment was most evident in the production program where a Lean approach towards manufacturing really did make a large difference. In every XBS Quarterly meeting, production would show the largest gain in regards to profits. This was perhaps not surprising, as a manufacturing organization that goes from non-Lean production to Lean production will typically see enhanced performance. Production was driven by the strictest approach towards adopting "best practices." Since production work practices are quite tangible and tied to the concrete physical setting, including the objects on the factory floor, they naturally cater to quantifiable observable change. One subject pointed out that, when a mistake occurred in production, it was obvious since fewer elements had simply left the production line. In a XBS Quarterly workshop, this researcher was seated with the leader of the production programme. He explained that part of the production programmes success came from the physical nature of the production line. When a change project at a manufacturing site was concluded, the manufacturing equipment itself would typically be moved to fit a new shop floor design. Naturally, it was impossible for production workers to fall back to the old mode of work, since the machines had moved. However, a PD would explain that in some sites it was hard to gain acceptance of the new practices. He explained that in his opinion, the only thing that could change the X-Corp organization was: "Whip, whip and more whip."He went on to describe that in his experience, the *only* way to get change at X-Corp was to ensure that 'not changing' was made more demanding than changing…

One simple but tangible "best practice" example from production was the implementation of keeping the factory floor tidy. This served to ensure that workers did not waste time when changing from one work shift to the next by ensuring that all things were in place (Figure 11). When everything had a fixed and clearly marked place, production could resume without much interruption. Manufacturing was the only programme that, without notice, would endure audits. In such audits, XBS auditors examined the whole facility and mode of work by inspecting physical artefacts as well as behavior. They would go over the production line from one end to the other, following a large spreadsheet and keeping score of numerous parameters. Inspection mostly took the binary form of "Yes/No" questions. In the wastebasket example above, one might ask: "Is the wastebasket in its proper place?" (inside the line is a "Yes" outside is a "No"). They would also audit how many hours per day, the site supervisor spent on the shop floor, and the frequency of him implementing improvements and changing Standard Operating Procedures. Registering numerous

parameters in numerous categories, the production site would get an overall score which, in essence, reflected the capability level of the facility.


*Figure 11:* The concept of marking the proper place of a wastebasket.

In production, the PUs did not use the PRG since they were not seated at PC-Workstations, but PDs would use the website, e.g., printing PRG schemas that needed to be filled out (Figure 12, below, top left). The usage of whiteboards put the production program in stark contrast to the other three programs, especially due to the high level of transparency offered. The whiteboards offered both an overview and made boundary objects for discussion. For instance, if there were a deviation from the expected production volume, workers would note it on paper and put it next to the daily output with a reason for the deviation. It was clearly visible who was working and who was sick. It was also visible how much had been produced during the present and the previous week. It was clear how much downtime a machine had, what incidents there had been, etc. The whiteboards served as fixed point for gaining an overview of the status of work and for coordinating the production effort. Anyone could read it, and the next shift would naturally be aware if there had been an incident, such as with faulty equipment.

Sales, purchase and innovation were in stark contrast to this transparent and quantifiable stance. In these programs, the participants were not the object of similar scrutiny and since knowledge assets resided in the XBS PRG site, they were far less visible. There was no sales dashboard, where anyone could see the performance on an hour-by-hour basis. There was no graph showing if Purchasers had been successful in attaining lower prices and the Innovation program did not have a chart displaying the number of business ideas completed in accordance with their “best practice” for doing so. Neither did they endure fine-grained “Yes/No” audits. Things were far less monitored and far less visible than in production. If a PO made a mistake in his

SharePoint® site, such as in training materials or providing a spreadsheet tool with a bug in it, it was largely invisible except to the actual PDs and PUs that would have to deal with it.


*Figure 12:* Whiteboards with overview and control data.

## 7. SUMMARY OF FINDINGS

Ethnographic fieldwork was undertaken creating a rich account of the situation that workers were in, and exhibiting sharing behavior in a company that subscribed to the strategic management perspective on knowledge. The focus was on highlighting concrete problems which prevented workers from taking a more active part in the creation of shared "best practices." The case thus indicates multiple difficulties (Table 1), when workers have to engage in global collaboration on continuous "best practice" improvement in a CSCW-System.

**Table 1.** Problems inhibiting knowledge sharing and further development of best practices

| Problem | Components |
|---|---|
| Informal process for changing practice | • Multi perspective (and ad hoc) workflow. The procedure is undocumented and dependent on the person spoken to.<br>• Practice Users cannot comment directly on "best practices," despite being the experts working with them daily.<br>• Informal handover process between often shifting Practice Owners results in clutter on the web pages and "best practices" being in a state of 'flux' and detached from local work practice. |
| Content complexity and quality | • Complexity of new "best practices" is higher than that in current daily operations, which results in local meta-documentation and branching of official "best practices."<br>• An abundance of complicated management terms in "best practices" descriptions deviates from actual work practice.<br>• Some users have problems with English as the corporate language.<br>• Local practitioners do not feel that generic Consult-Inc practices are good enough i.e., Process Drivers feeling embarrassed having to sell them to Process Users.<br>• Practice tools are, in fact, Excel-based software tools, but Process Owners are unfamiliar with the software development cycle, usability, change logs etc. |
| Computer literacy | • Users are not advanced Internet users and therefore unfamiliar with a web portal based workflow and are not offered training in it.<br>• General poor computer manners e.g., linking to very large files or downloading all content to a local hard drive.<br>• Process Owners have unrealistic expectations in regards to software development and development speed.<br>• Management only has rudimentary understanding of software i.e., grossly understaffing the Portal system. |
| IT development | • Static approach to IT, where customizations are avoided to ensure stability and lower maintenance costs.<br>• Lack of CSCW ownership i.e., no clear owner of a malfunctioning intranet search engine. |
| Organizational complexity | • Multiple directions set by XBS- and local managers.<br>• Very complex organization i.e., having to align with 22 people to consolidate a decision.<br>• A culture of loyalty rather than one of performance. |
| Who's best practice? | • Issues with generic "best practices" purchased from an external vendor i.e., out-of-domain examples used to explain concepts.<br>• Misalignment between XBS theoretical approach towards work "best practice" and the more practical local work practices.<br>• Lack of clear X-Corp cases of success with "best practices." |
| No incentives | • No monetary incentives offered for "best practice" improvement.<br>• No clear "What's in it for me" proposal made to "the people that have to do the typing." |

# 8. CONCLUSION

This paper has presented findings of an empirical study of a web-based CSCW portal system intended to support knowledge sharing and content development of corporate "best practices" in a company that subscribed to the strategic knowledge management perspective. An account of the workers and their context was created based on fieldwork targeting their daily work and the problems that negatively influenced their sharing behavior. The paper has thus sought to offer a contribution to the existing understanding of the complexity of the organizational setting that influences such work, adding to the existing body of knowledge e.g., (Orlikowski 1992, Bansler, Havn 2002, Grudin 1994). Notably, many findings made were rediscoveries of known problems.

Nevertheless, several problems were uncovered that aid our understanding of why collaborative activity in regards to knowledge sharing and development is very hard to attain in a corporate context. The work presented here – again – demonstrates that CSCW-Systems, in the words of an informant, have to make sense for "the people that have to do the typing." It also indicates how difficult and complex it is to reach any consensus and to gain an adequate overlap in priorities, since many actors in very different situations are involved. For the same reason, the case leads us to speculate whether the "stock" approach towards knowledge management (Huysman, Wit de 2002) might be conceptual rather than a robust strategic option for companies. The knowledge based perspective of the firm seems inherently challenged by the underlying assumption that codification can take place to transfer knowledge between workers, but as seen from the case presented here, most of the practical issues and steps needed to facilitate such transfer are in themselves very difficult to realize. Future studies seeking to address this topic could investigate how managers in global corporations perceive CSCW-Systems for knowledge management, and what their understanding of them is: Why are so many known mistakes reenacted? What is the basis of their decision making, when delegating: the selection of CSCW-system, its design and its strategic deployment, and what type of reasoning is at play? Where do their expectations come from? These questions remain to be answered in future research.

# REFERENCES


Alavi, M. & Leidner, D.E. 2001, "Knowledge management systems: issues, challenges, and benefits", *Commun.AIS,* , pp. 1.

Alvesson, M. & Karreman, D. 2001, "Odd Couple: Making Sense of the Curious Concept of Knowledge Management", *Journal of Management Studies,* vol. 38, no. 7, pp. 995-1018.

Bansler, P., J & Havn, C., E. 2002, "Knowledge Sharing in Heterogeneous Groups: An Empirical Study of IT-Support for Sharing Better Practices", http://www.alba.edu.gr/OKLC2002/Proceedings/menu.html.

Bardini, T. 2000, *Bootstrapping - Douglas Engelbart, Coevolution, and the Origins of Personal Computing,* Stanford University Press, Stanford, California, USA.

Ciborra, C. 2000, *From control to drift: The dynamics of corporate information infrastructures,* Oxford University Press, Oxford [England] and New York.

Coakes, E. 2004, "Knowledge Management--a Primer", *Communications of AIS,* vol. 2004, no. 14, pp. 406-489.

Creswell, J., W. 2003, *Research Design - Qualitative. Quantitative, and Mixed Methods Approaches,* Second edn, Sage Publications Inc., California.

Drucker, P.F. 2005, *The Essential Drucker - The best of sixty Years of Peter Drucker's essential writings on management,* First Collins, New York.

Engelbart D., C. 1962, *, Augmenting Human Intellect: A Conceptual Framework* [Homepage of SRI International], [Online]. Available: http://www.dougengelbart.org/pubs/augment-3906.html [2010, 02/26] .

Galbraith, J.R. 1971, "Matrix organization designs How to combine functional and project forms", *Business horizons,* vol. 14, no. 1, pp. 29-40.

Grant, R.M. 1996a, "Prospering in Dynamically-Competitive Environments: Organizational Capability as Knowledge Integration", *Organization Science,* vol. 7, no. 4, pp. 375-387.

Grant, R.M. 1996b, "TOWARD A KNOWLEDGE-BASED THEORY OF THE FIRM.", *Strategic Management Journal,* vol. 17, pp. p109.

Grudin, J. 1994, "Groupware and Social Dynamics - Eight Challenges for Developers", *Communications of the ACM,* vol. 37, no. 1.

Huysman, M. & Wit de, D. 2002, "A Critical Evaluation of Knowledge Mangement Practices" in *Sharing Expertise: Beyond Knowledge Management*, eds. M.S. Ackerman, V. Wulf & V. Pipek, MIT Press, Cambridge, MA, USA.

Nonaka, I. & Takeuchi, H. 1995, *The knowledge-creating company: How japanese companies create the dynamics of innovation,* Oxford University Press, New York.

Nonaka, I. 1991, "The Knowledge-Creating Company", *Harvard Business Review,* vol. 69, no. 6, pp. 96-104.

Nonaka, I. & Konno, N. 1998, "The concept of 'Ba': Building a foundation for knowledge creation", *California management review,* vol. 40, no. 3, pp. 40-54.

Orlikowski, W.J. 1992, "Learning from Notes: organizational issues in groupware implementation", *CSCW '92: Proceedings of the 1992 ACM conference on Computer-supported cooperative work*ACM, New York, NY, USA, pp. 362.

Patton, M., Quinn 2002, *Qualitative Research & Evaluation Methods,* Third Edition edn, Sage Publications, Inc, Thousands Oaks, California.

Polanyi, M. 1966, *The Tacit Dimension,* Doubleday, Garden City, NY.

Randall, D., Harper, R. & Rouncefield, M. 2007, *Fieldwork for Design - Theory and practice,* Springer-Verlag, London.

Ryle, G. 2000 (1946), *The concept of mind / by Gilbert Ryle,* 4'th edn, Penguin Books, England.

Schmidt, K. 1991, "Riding a tiger, or computer supported cooperative work", *ECSCW'91: Proceedings of the second conference on European Conference on Computer-Supported Cooperative Work*Kluwer Academic Publishers, Norwell, MA, USA, pp. 1.

Schmidt, K. & Bannon, L. 1992, "Taking CSCW seriously", *Computer Supported Cooperative Work (CSCW),* vol. V1, no. 1, pp. 7-40.

Schultze, U. 2000, "A Confessional Account of an Ethnography about Knowledge Work", *MIS Quarterly,* vol. 24, no. 1, pp. 3-41.

Spender, J.-. & Grant, R.M. 1996, "Knowledge and the Firm: Overview", *Strategic Management Journal,* vol. 17, pp. 5-9.

von Krogh, G. 1998, "Care in Knowledge Creation.", *California management review,* vol. 40, no. 3, pp. p133.

Wenger, E. 2004, "Knowledge management as a doughnut: Shaping your knowledge strategy through communities of practice", *Ivey Business Journal,* [Online], vol. Ivey Business Journal January/February, no. January/February 2004.

Wenger, E. & Snyder, W. 2000, "Communities of practice: the organizational frontier", *Harvard business review,* vol. 78, no. 1, pp. 139-145.

Wenger, E. 1998, 2008, *Communities of Practice Learning, Meaning and Identity,* 16th edn, Cambridge University Press, USA.

Yin, R.K. 2009, *Case Study Research: Design and Methods, Third Edition, Applied Social Research Methods Series, Vol 5,* 4th edn, Sage Publications, Inc, Thousands Oaks, California.

# APPENDIX 1:

Examples of vendor descriptions of portal based CSCW software.

Microsoft SharePoint:

> *"What is SharePoint?*
> *Microsoft Office SharePoint® Server 2007 is an integrated suite of server capabilities that can help improve organizational effectiveness by providing comprehensive content management and enterprise search, accelerating shared business practices, and facilitating information-sharing across boundaries for better business insight. Additionally, this collaboration and content management server provides IT professionals and developers with the platform and tools they need for server administration, application extensibility, and interoperability."*
>
> Via. http://sharepoint.microsoft.com/Pages/Default.aspx [04/04/10]

IBM Lotus Notes:

> *"**Collaboration solutions that drive business value***
> *Reduce costs*
> *Save money on travel, operational expenses, and infrastructure costs.*
>
> *Maximize employee potential*
> *Enable your most valuable corporate asset - your people - to be as productive and responsive as possible.*
>
> *Collaborate in the cloud*
> *Bring people and information together quickly, simply and securely with a suite of online services.*
>
> *Strengthen relationships*
> *Give your customers and partners a new online voice and include them in your business practices.*
>
> *Foster innovative teams and communities*
> *Drive growth with vibrant business communities and empowered participation across teams.*
>
> *Accelerate your business practices*
> *Use collaboration to make your business practices faster and more efficient."*
>
> Via: http://www-01.ibm.com/software/lotus/ [04/04/10]

# **Appendix 5:** Paper 5

**Title:** Applying the Persuasive Systems Design Model for Knowledge Sharing in a Corporate Setting
**Content:** In depth description of problems preventing the true adoption of the knowledge management system at Danfoss
**Pages:** 12

**To be submitted:** Persuasive 2011

# Applying the Persuasive Systems Design Model for Knowledge Sharing in a Corporate Setting

Kristian Tørning,

Department of Organization, Copenhagen Business School,
Kilen, Kilevej 14A, 4.,
2000 Frederiksberg, Denmark
krt.ioa@cbs.dk

**Abstract:** We have several models for Persuasive Design, but we lack account experiences in applying them to concrete design problems. In this empirical study, prototypes were created using the Persuasive Systems Design Model to invoke the target behavior of sharing knowledge online in a corporate setting. The prototypes were user-tested in a workshop. The main contribution lies in the experiences in applying the model to a design problem, and thus the issues uncovered while engaging actively in the act of Persuasive Design.

**Keywords:** Persuasive design, persuasive systems, persuasive systems design, design models, persuasive technology

## 1 Introduction

Despite the concept of Persuasive Design being relatively new, [1], [2], [3] the field offers practitioners several Persuasive Design Methods. Each presents a formalized approach for creating artifacts that may persuade users to transform their behavior. Perhaps it is not a surprise that the methods are mostly conceptual. We have little or no empirical validation of their application and effect.

Although the first method presented was Fogg's functional triad in 2003 [1], [4], [5], [5], [6], we hardly find any dissemination of this seven year old framework's actual application to produce persuasive artifacts. Fogg has recently produced two newer models: An eight step model [7] and a behavior model [8]. Oinas-Kukkunen & Harjuma have presented the Persuasive Systems Design model [9], [10] and Dan Lockton et al. have put forth a Design with Intent model. [11], [12]

We have few examples of these models being used to create Persuasive Designs, which is somewhat critical as we know, that most papers for Persuasive are experimental [13]. If the field of Persuasive Design should transcend common sense based approaches towards design, we should aim at creating reliable knowledge of design models and their application. From the stance of Design Science, Hevner [14] has addressed some of the issues pertaining to a systematic approach for testing design methods to predict human behavior. March and Smith [15] describe how design,

as compared to natural sciences, are left with weaker validations models for experiments and how design scientists develop *methods* as ways of performing goal-directed activities.[15] We face the same challenges: how do we validate our design models? How can we claim that we hold secure knowledge that is generalizable into normative design guidelines? This article addresses part of this problem by disseminating findings from an empirical study of the application of one of the Persuasive Design models: The Persuasive Systems Design model (PSD-Model).[10] Prototypes were created to address concrete knowledge sharing problems at a large industrial corporation. They were tested in a workshop with users and feedback was collected. Thus, the study presented here provides insight into conducting persuasive design using the PSD-Model and empirically seeks to validate its utility.

The papers structure is as follows: Firstly, a short introduction to the case explaining the main behavioral problems, which the persuasive design should address. Secondly, the Persuasive Systems Design-Model is introduced and explained with the case. Thirdly, prototype examples are introduced and the user's feedback is disseminated. Lastly, conclusions are drawn and wider implications discussed.

## 2 The Case

The case company is the global corporation "Alpha-Corp".[1] The company has problems with employees' not sharing knowledge concerning business processes online. There is a clear shortage of contributing behavior online, where employees must update and contribute to business processes describing production, sales and innovation. In essence, anyone that works using a process should contribute with tweaks and novel ideas towards its improvement. Optimally this should be a natural and continuous part of everyday work. Processes Owners, in particular, should exhibit the target behavior of supplying fresh knowledge and are responsible for collecting feedback and incorporating it into the processes. Process Owners often work from global headquarters, while Process Users often work locally, for instance in offices in China, EU or America. However, the contribution ratio is too low. Process Users do not contribute to the web-portal, where the Process Owners host process descriptions and software-tools.

Alpha Corp management envisions that using fresh business processes dubbed 'best practice' will boost the overall profitability of the company. It has however proven difficult to get employees to engage in exhibiting sharing behavior. Regardless, the company strategy is to adopt a knowledge based view of the firm.[16] This has only made it more important that employees take part in this globally online knowledge sharing. The wanted target behavior is clear and so is the transformation that has to be created, thus both Process Owners and Process Users have to be persuaded into exhibiting more sharing behavior.

[1] This acronym is used throughout the paper.

Prior to embarking on the actual design of prototypes, two heats of extensive ethnographic fieldwork [17] were undertaken to uncover pain points. Over the course of six months data was created to understand the employees' situation.

Findings included: Problems with high complexity of the content offered in the web portal. Issues with working online with content e.g. some Process Owners published changes without any clear version control, causing great distress to local Process Users. Cognitive issues were also uncovered. While some users had poor English language skills which prevented their participation, others had problems with computer literacy and found it difficult to use the SharePoint® system that they had at their disposal. Managerial problems included multiple direction setting and a lack of clear incentives for engaging in sharing behavior. For instance a Process User might have a local manager that did not care much for corporate 'best practice' and did not reward their usage, while the Process User simultaneously had to engage with visiting corporate consultants, who wanted to use the processes in local projects. This caused tension between local and corporate departments. Thus, there were differences between the corporate perception of 'best practice' and the local offices de facto work practice. In some local departments, this had resulted in general change resistance, and some Process Users said: "Who's 'best practice'?", as they simply felt the processes did not address their concrete needs.

Clearly, many of the issues found, would be not be addressable with a persuasive design i.e. lack of monetary incentives, multiple direction setting, cognitive problems in regards to operating a computer or writing prose are not things easily resolved in a web portal. However, the design task was clear: To create a system design that would actively persuade more sharing behavior thus resulting in more comments, suggestions and questions. This is the design case presented here.

## 3 Theoretical approach: The Persuasive Systems Model

The Persuasive Systems Design model (PSD-Model) [10] was selected for creating prototypes to address the situation at Alpha Corp. The PSD-model is currently the most extensive Persuasive Design model, however it is still conceptual and Oinas-Kukkonen and Harjumaa themselves write "…we define seven postulates that need to be addressed when designing or evaluating persuasive systems" (p. 487).[10] As the case addressed here was complex, the main effort went into determining the most top-level issue in regard to the web based system. Which of the many pain points uncovered by the fieldwork should or could a design address? Each was on its own terms inhibiting the target behavior of sharing, so what would be the main driver of behavior change? An answer emerged from applying the PSD-model.

The model was applied "top-down" (see figure 1 below). Thus pain points were carefully evaluated along each model construct, starting with the PSD core components: the intent, the event and the strategy.

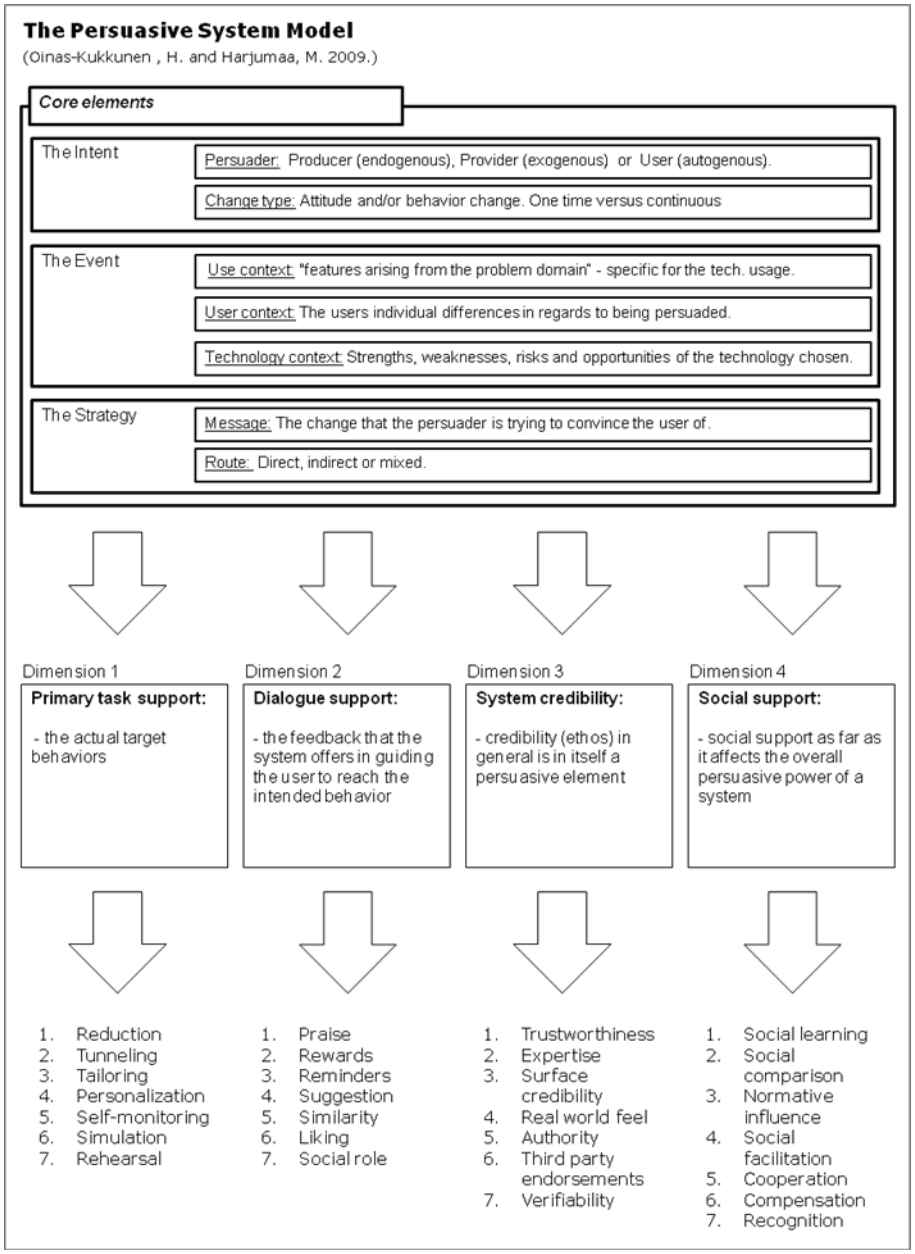



**Figure 1.** PSD-Model overview.[10] In the study it was applied with a top-down approach.

### 3.1 Applying the PSD-Framework to Alpha Corp's intentions

**The intent [persuader and change type]:** For the case presented here, the 'intent' contained the Persuader, which was the corporate management. The management at Alpha-Corp wanted to commission the system, thus in Foggian terms the persuader was 'exogenous'.[1] Both the producer and the designer of the system were only acting on the management's behalf and the target audience did not themselves seek a persuasive design to motivate them. The 'Change type' sought by management was to have employees exhibit more knowledge sharing behavior online. Accordingly, the change was mixed as the system had to address both attitude and behavior. The object was to achieve a sustainable change by designing a new system for sharing knowledge on business processes. The new system should therefore continuously persuade that exact behavior in a sustainable way.

**Event [Use-, User- and Technology-context]:** The event is comprised three factors: 1) Use context: the problem domain features, 2) The user context: user dependent features e.g. personal goals, attitudes, experiences, cognitive skills etc. - and 3) The technology context incorporates technology dependent features such as: strengths, weaknesses, risks and opportunities of the technology chosen. Here the 'use context', pertains to the domain of knowledge sharing in a professional environment such as: competition, lack of time, lack of real reasons to share etc. etc. Many concrete issues had also been uncovered by the fieldwork at Alpha Corp. The 'user context' was also was uncovered by fieldwork. The main pain points found were poor cognitive IT skills and language issues. User dependent features were features such as giving personal goals priority over corporate strategy, personal attitude towards sharing, negative experiences with previous corporate initiatives, etc. The 'technology context', was predetermined as the web platform used, had to be the Microsoft™ SharePoint® server. Notably, the management decided the 'event' at Alpha Corp and they wanted a behavior change with regard to the usage of the online environment; however, they had failed to invoke that behavior by mere decree.

**Strategy [Message and Route]:** The strategy is composed of a 'Message' which is the target behavior that the user is to be persuaded, whereas the 'Route' is the way that the users is to be persuaded and is either direct, indirect or mixed. "The route selection depends on the user's potential to carefully evaluate the content of the persuasive message. If (s)he is able to do that, a direct route could be used"[10]. Oinas-Kukkonen and Harjumaa, further state that in adopting a direct route, we appeal to reason, but due to information overload we can be forced to employ indirect cues. A direct approach will thus clearly state the message revealing its internal logic, whereas an indirect approach will be covert, seeking to invoke a behavior without an explanation of why. A mixed approach will do both.

In this case, determining the proper 'message' was troublesome, as the preceding analysis had clearly revealed plenty of sound reasons that would justify why users were reluctant to contribute. In the terms of personal evaluation,[18] it was hard to address the situation via an appeal to altruistically share knowledge to boost the

overall profitability of Alpha Corp. In addition, this strategy had already failed. Restating the same rejected argument in a new manner seemed less appealing. Therefore, the main challenge was to invent a different and more fitting message and to shape it into an appropriate argument that could be embedded in web software. After careful consideration, the main message selected addressed the issue of *transparency* in the work done online. Whenever a user failed to take action, this was shown loud and clear in the interface itself. This approach would make it more evident when sharing was not taking place and also who was contributing and who was not. This social appeal was deliberately posed to extend the users' evaluation of the target behavior beyond a mere individual evaluation [18] into a more norm based one. Accordingly, the argument embedded in the design would be visible to all users if one user did not update. The top-level argument posed was "Users will update, if it's visible that work is not taking place and who is responsible for it". The argument was anchored in the assumption that it would especially cause social dissonance for Process Owners if everybody could see that they did not tend to their responsibilities. An indirect route was taken, and while problems with lack of updating and sharing were made clearly visible, the user was left on his own to do the reasoning. No explanations were offered as to why content had to be fresh and updated. It was just made clear, when this did not occur.

**Four Persuasive Dimensions:** The PSD model offer four persuasive system dimensions[2] that can act as modes of influencing: 'Primary task support', 'dialogue support', 'system credibility support' and lastly 'social support' (see figure 1). Each dimension is used in delivering the message influencing. Primary task support aid the user in accomplishing, what he is setting out to do for instance by reducing the cognitive strain in doing a task or by allowing the user to rehearse a behavior. The 'Dialogue support' dimension addresses feedback from the system to the user that is computer-human dialogue e.g. the system praises or reminds of proper behavior. 'System credibility' is addressed as to bolster the overall credibility, addressing if the users trust in the system for instance by appealing to surface credibility (does it look as we would expect?) third-party endorsements (~ethos sponsorship), trustworthiness (is the information provided by the system truthful, fair and unbiased?). Lastly, 'social support' describes factors that can be addressed in design, so that it motivates users by leveraging social influence e.g. social learning, social comparison and normative influence. For the design, that was created here, the users would be given the experience, that their own actions online (or lack hereof) was made transparent and the message selected was that users would update, if it were visible when they did not. At design time, each dimension and its principles were evaluated for its potential to support the message, this was an easier process, that inventing the message itself, as the PSD-Model offers clear examples of each principle in each dimension.

From the Primary task dimension, the principle of 'self monitoring' was deemed the most relevant. When a system employs this principle it keeps track of

[2] For in depth descriptions of the dimensions see: Oinas-Kukkonen & Harjumaa (2009).

performance and goal completion. For the case at hand, the rationale was that if it was clearer to the individual that he had tasks that needed attention he would feel accountable for doing them. For instance, if a Process Owner missed the target of updating documents, the documents describing that process would be flagged with a red marker. In a similar fashion, if a set of processes or a document had many bugs or requests for change, and that was unresolved. Notably, it was also visible to all users, that action was missing. The principle of 'tunneling' was used especially to make it clearer, who had filed a change request and who had currently had to take action so progress could be made. The 'personalization' principle was employed in one case, so that users could subscribe to information of their preferred content and thus get email updates on changes. From the Dialogue support dimension the principle of 'praise' and 'reminders' were adopted. Explicit praise was supplied, when users' added comments and email reminders were send to the person that had to take action. From the system credibility support dimension the principles of 'authority' was mostly employed. In the given situation, the processes were to be the official and formal business processes. Finally, from the dimension of social support, 'social comparison' and 'normative influence' was used to drive the main point, that updating was a social effort. Users could see if others took part and also to what degree they had taken part themselves.

**Table 1.** Design Principles employed to support the main message of transparency.

| Dimension | Principle | Implementation |
|---|---|---|
| Primary task | Self monitoring | Tracking of goal completion and clearly flagging low performance. |
| Primary task | Tunneling | Visualizing, who "has the ball" and responsibility for taking action. |
| Primary task | Personalization | Allowing users to subscribe to their preferred content updates by email. |
| Dialogue support | Praise | System offers explicit praise when users engage in target behavior. |
| Dialogue support | Reminders | System sends email reminders to the person to act next. |
| System credibility | Authority | Official and formal language used to boost the credibility of processes. |
| Social support | Social comparison | Making it easy to compare who is engaging and who is not. Contributions are visible. Allow commenting and rating |
| Social support | Normative influence | Making the user feel the norm of Alpha Corp. "Here we update". Allow commenting and star rating |

# 4 Translating findings into Prototypes

In software development prototyping is a well known approach [19], [20], for the work presented here four scenarios comprised of a medium fidelity [21] PowerPoint slide deck with accompanying scenario descriptions were made and presented to users.

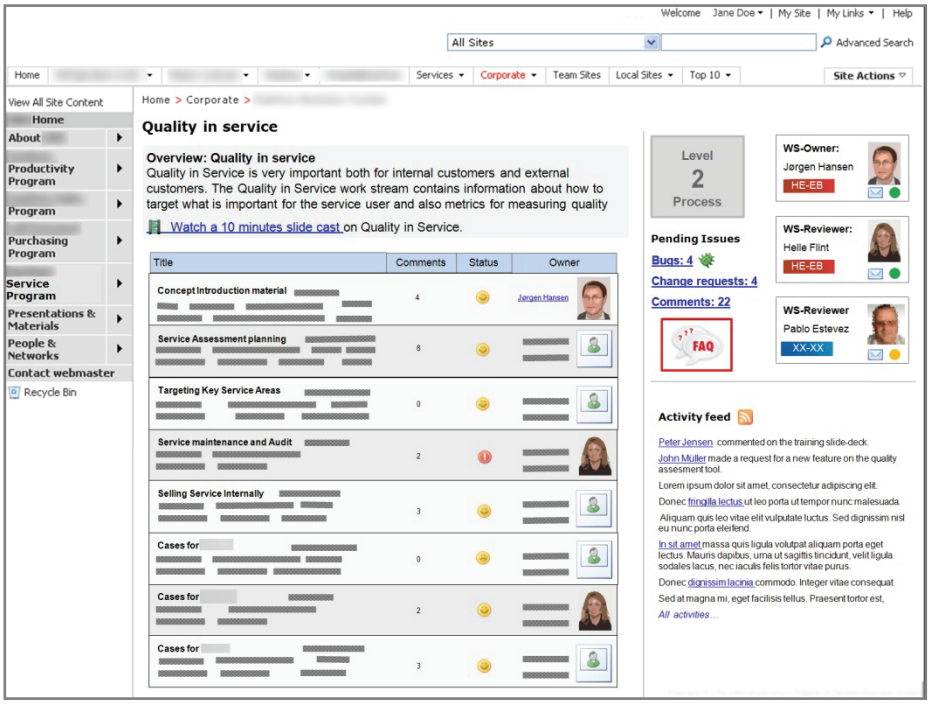



**Figure 2:** Business overview processes. ”Level 2” indicates a process not fully mature. Processes Owners are shown next to the processes they each marked with smiles, ranging from happy to sad to a red exclamation mark for critical problems.

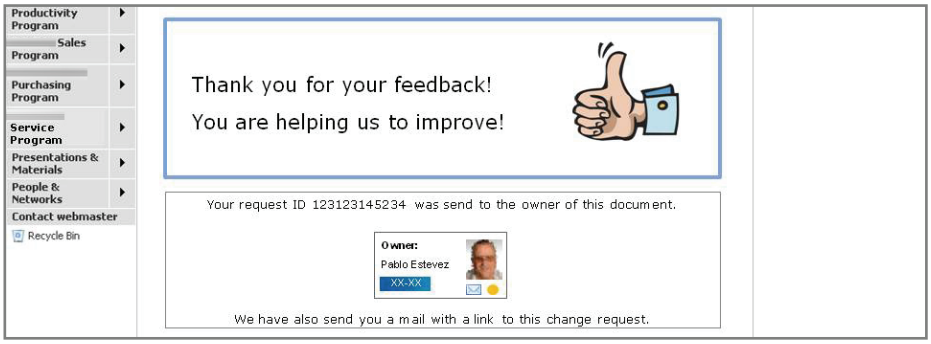



**Figure 3:** The dialogue support principle of praise: The system explicitly offers praise when the user performs the target behavior of adding a comment or a change request.

## 5 Validation Workshop and User Feedback

Four subjects that worked locally as Practice Drivers in the role of having practices adopted took part in a 6-hour validation workshop. The presentation of the prototypes took place in plenum using a projector and was recorded. Each presentation began with a brief introduction to the scenario itself providing the context of what the subjects was about to see. The click stream and each screen were explained as a generic persona solved work related tasks using the prototype. Subjects were openly encouraged to interrupt and ask questions or add comments. After each scenario, 40 minutes of open discussion took place to obtain feedback i.e. impressions and ideas for improvements. The Persuasive Design concept itself was covertly tested and never mentioned to subjects, however it was openly discussed that concept of the prototypes were to invoke more knowledge sharing behavior.

In general subjects welcomed the prototypes presented. Plenty of feedback and several ideas were collected for further improvement, but the subjects overall impression was that the concept was good. They expressed that such a system would be welcomed, one subject asking when the system could be done. The message of transparency was thus accepted, but with some precautions. While subjects agreed that the clarity offered by the primary task support principals (see table 1) would indeed push users to deliver more feedback, they also aired concerns, since it would result in more work. In the words of one subject:

> "You know actually, lots of people, every single person from several divisions can have great ideas. And maybe every single thing [e.g. process tools] is somehow customized, and you can't put that into one template at all. So now you get bombed with lots of change requests, and that is an important KPI [Key Performance Indicator] for your salary, and now you get frustrated because you get into trouble…"

Subjects also questioned the quality of the feedback that they would get. For instance, when the content star rating system was presented, a subject humoristically remarked:

> "I'm thinking, the star rating, we should definitely have that on the corporate site and not on my site".

This resulted in general laughter, but he went on to state, that it was problematic if content was not presented as being finished or official. He questioned, that content with a low rating, would ever be adopted by employees. There was also a concern among all subjects that employees would unfairly rate content without really understanding it.

As for dialogue support (table 1) email reminders were welcomed, while the "Thumbs up" praise offered (figure 3) seemingly had no effect. No subjects interrupted or commented on the idea, and it did not surface in later discussions.

System credibility and a general appeal to authority was welcomed; however it seemed that this was more grounded in the wish that Alpha Corp managers would

take a clearer stance on the official way of working with processes. This also surfaced in regards to the social support principles of 'social comparison' and 'normative influence'. The debate on those aspects of the design, would mostly address the culture at Alpha Corp, as such, there was not much success with pushing users beyond their individual evaluation in regards to sharing and into a norm based one.

The prototypes spawned a lot of debate and in that sense were successful as boundary objects that facilitated lengthy discussions. Predominantly however, many issues were not technology issues, thus more time was spend debating organizational issues than ICT issues. Topics such as: Content quality, the general strategy approach, the managements will to make changes etc. would take up most time. At the end of the session the recorder was turned off in the subjects' plain view. This concluded the workshop, but it also resulted in more open heartily discussion. One subject spoke about one a set of processes and quite bluntly stated: "It doesn't work at all. We have been trying for two years; it gives us a bad reputation." – again a clear content issue.

Seen in hindsight, the prototypes designed here, might not have made the best case for trying to test the PSD-Model. The organizational complexity uncovered by the fieldwork was very high and other designers have noticed that such 'wicked' design problems [22] might not be the best place to begin, when engaging in Persuasive Design. In his behavior model B.J. Fogg points out that one should avoid "The Mount Everest of behavior change".[7] After undertaking this study, I would have to agree. However, here the design case was determined by the Alpha Corp management and the only option was to try to climb the mountain.

## 6 Findings from Using the PSD-model

The PSD-model offers designers valuable insights when developing persuasive design. The model does not prevent an iterative process but it caters more to a linear design approach, which is especially beneficial, when working under a clear time constraint. The model ensures that designers consider central aspects of persuasive ICT design thus aiding in producing fitting persuasive designs. The model offers example-based lists of known principles for computer-based persuasion. Since each principle, is supplied with a clear illustrative example, the designer is guided through his options for appealing to the users along four clearly defined dimensions of persuasion. The dimensions and principles appear to be diverse and seemly allow for the addressing many situations. Lockton et al (2009), goes so far as to state, "A design method […] is only of value if the designers find it useful" [12], in that regards the PSD-Model was a success for the prototypes created here. The model offered a clear path through the decision making process at design-time and was indeed useful.

From a critical perspective, the model does not aid in the actual creation of a persuasive message. The approach used for the case above, where a plain argument was first formulated and then supported by principals did not originate from the PSD-Model. The model offers no alternative approach to this part of the design effort. In that sense constructing the actual message becomes a taken for granted part of creating a persuasive design. In employing the model, the designer is also left on his

own to figure out, what to articulate in the design and how to mix the dimensions and the 28 design principals – for instance, is it better to only address one dimension extensively, or to employ more than one? Lastly, the model, does not offer help in determining the feasibility of engaging in technology mediated persuasion. In addressing the core-elements of the model, the model would never discard anything it seems all situations are addressable by technology design, however, the case undertaken here hints in another direction. It might be possible to device a set of perquisites for persuasion.

## 7 Conclusion

The design case presented here is a first small step on a long path towards gaining a deeper understanding of how to describe experiences in the application of Persuasive Design Models. We should undertake this effort in order to push Persuasive Design in a direction of becoming a more normative field. The goal must be to develop methods that allow others, with some degree of robustness, to create designs that will be predictably persuasive. To become a clearly normative field with clear normative implications, we have to be able to justify our design choices when creating persuasive designs. There is a need for a serious effort to validate and further develop models that allow us to design for behavior change. In creating and validating persuasive design models, we face serious challenges. Testing a model is in itself a demanding task. To do a full test, one would not only need to create designs and adhere to the design method tested, one would also have to test the result with running code and end-users to determine, if they are actually persuaded into the target behavior. From a positive perspective, the field of persuasive design is encountering some of the same challenges that the field of HCI and IS all ready have, and thus it might make sense for us to seek inspiration there, while noting the extra layer and challenges in regards to measuring whether or not persuasion has taken place.

## 8 References

1. Fogg, B. J.: Persuasive Computers: Perspectives and Research Directions. CHI 98 Los Angeles USA - 18-23 April 1998, (1998) 225
2. Fogg, B.: Persuasive Technologies. Commun ACM, 42 (1999) 26-29
3. Berdichevsky, D., & Neunschwander, E.: TOWARD AN ETHICS OF PERSUASIVE TECHNOLOGY. Commun ACM, 42 (1999) 51
4. Fogg, B. J.: Persuasive technology - using computers to change what we think and do. Morgan Kaufmann Publishers, San Francisco (2003)
5. Atkinson, B.: Captology: A Critical Review. Persuasive Technology, (2006) 171-182

6. Dillard, J., P., & Pfau, M., W.: The persuasion handbook: Developments in theory and practice. 1 edition edn. Sage Publications, Inc;, Thousands Oaks, California (2002)
7. Fogg, B.: Creating Persuasive Technologies: An Eight-Step Design Process. (2009) 1-6
8. Fogg, B.: A Behavior Model for Persuasive Design. (2009) 1-7
9. Oinas-Kukkonen, H., & Harjumaa, M.: A Systematic Framework for Designing and Evaluating Persuasive Systems. Persuasive Technology, (2008) 164-176
10. Oinas-Kukkonen, H., & Harjumaa, M.: Persuasive Systems Design: Key Issues, Process Model, and System Features. Communications of the Association for Information Systems, Vol. 24, Article 28 (2009)
11. Lockton, D., Harrison, D., Stanton, N., A.: Design with Intent: Persuasive Technology in a Wider Context. Persuasive Technology, (2008) 274-278
12. Lockton, D., Harrison, D., Holley, T. et al.: Influencing Interaction: Development of the Design with Intent Method. (2009) 1-8
13. Torning, K., & Oinas-Kukkonen, H.: Persuasive System Design: State of the Art and Future Directions. (2009) 30
14. Hevner, A. R., March, S. T., Park, J. et al.: Design Science in Information Systems Research. MIS Quarterly, 28 (2004)
15. March, S. T., & Smith, G. F.: Design and Natural Science Research on Information Technology. Decis. Support Syst., 15 (1995) 251-266
16. Grant, R. M.: TOWARD A KNOWLEDGE-BASED THEORY OF THE FIRM. Strategic Manage. J., 17 (1996) p109
17. Randall, D., Harper, R., Rouncefield, M.: Fieldwork for design - theory and practice. Springer-Verlag, London (2007)
18. Ajzen, I., & Fishbein, M.: Understanding attitudes and predicting social behavior. Facsimile edition edn. Prentice Hall, Upper Saddke River, NJ 07458, USA (1980)
19. Dix, A., Finlay, J. E., Abowd, G. D. et al.: Human-Computer Interaction (3rd Edition) (Hardcover).
20. Buxton, B.: Sketching user experiences: Getting the design right and the right design. 1'st edn. Morgan Kaufmann, San Francisco (2007)
21. Arnowitz, J., Arent, M., Berger, N.: Effective prototyping for software makers. 1'st edn. Morgan Kaufman, San Francisco (2007)
22. Rittle, H. W. J., & Webber, M. M.: Dilemmas in a General Theory of Planning. Policy Sciencens, 4 (1973) 155-169

# Appendix 6: Survey

By completing the form below you take part in a competition to win EUR 250 in the form of a special bonus. You will also get the results from the survey

It should take about 10 minutes to complete this one page survey.

Please state your age:

- ☐ less than 24 years
- ☐ 25 - 29 years
- ☐ 30 - 34 years
- ☐ 35 - 39 years
- ☐ 40 - 44 years
- ☐ 45 - 49 years
- ☐ 50 - 59 years
- ☐ more than 59 years

Please state the number of years you have been with The Danfoss Group

- ☐ Less than 1 year
- ☐ 2 - 5 years
- ☐ 6 - 10 years
- ☐ 11 - 15 years
- ☐ 16 - 20 years
- ☐ More than 20 years

What is your level of education?

- ☐ High school diploma
- ☐ University degree
- ☐ Other

## Please rate the following questions 1-7.

If you completely *disagree* with a statement you should rate it 1.

If you complete *agree* with a statement you should rate it 7.

| | |
|---|---|
| I find that information systems and software at Danfoss are designed to be user-friendly. | Disagree 1 2 3 4 5 6 Agree 7 |
| I find it easy to use information systems at Danfoss without extra training. | Disagree 1 2 3 4 5 6 Agree 7 |
| I use spreadsheets, documents and presentations from the PRG (Process Reference Guide) in my daily work. | Disagree 1 2 3 4 5 6 Agree 7 |
| If I help my colleagues by sharing knowledge they tell me that I did something good. | Disagree 1 2 3 4 5 6 Agree 7 |
| I have received a monetary reward for contributing with knowledge or by improving a business process at Danfoss. | Disagree 1 2 3 4 5 6 Agree 7 |
| If I share knowledge at Danfoss it is clearly visible to my collegues or managers that I contributed with value. | Disagree 1 2 3 4 5 6 Agree 7 |
| My manager regularly asks me to share knowledge following a well established process. | Disagree 1 2 3 4 5 6 Agree 7 |
| In my daily work I am encouraged to communicate new learning's to colleagues. | Disagree 1 2 3 4 5 6 Agree 7 |
| My manager assigns dedicated time for sharing knowledge for example in meetings. | Disagree 1 2 3 4 5 6 Agree 7 |
| I use social software such as blogs, wikis and community sites (for instance facebook.com, myspace.com, orkut.com, linkedin.com or similar). | Disagree 1 2 3 4 5 6 Agree 7 |
| I produce content on the internet for instance in debate forums, by blogging, commenting on news articles or by rating products from commercial sites. | Disagree 1 2 3 4 5 6 Agree 7 |
| I use the internet for entertainment and recreation. | Disagree 1 2 3 4 5 6 Agree 7 |
| I would be willing to actively participate in innovating business processes in online groups at Danfoss | Disagree 1 2 3 4 5 6 Agree 7 |
| I would be willing to submit strategies that I use to a Danfoss intranet website for sharing business practices. | Disagree 1 2 3 4 5 6 Agree 7 |
| | Disagree 2 3 4 5 6 Agree |

| | 1 | | | | | | 7 |
|---|---|---|---|---|---|---|---|
| I believe that I have useful knowledge to contribute to such a project. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |

Optional:
Please feel free to provide any additional feedback in relatior organization.

Thank you very much for you feedback!

Kristian Tørning
on behalf of the Danfoss Sales Program

**TITLER I PH.D.SERIEN:**

**2004**

1. Martin Grieger
*Internet-based Electronic Marketplaces and Supply Chain Management*

2. Thomas Basbøll
*LIKENESS*
*A Philosophical Investigation*

3. Morten Knudsen
*Beslutningens vaklen*
*En systemteoretisk analyse of moderniseringen af et amtskommunalt sundhedsvæsen 1980-2000*

4. Lars Bo Jeppesen
*Organizing Consumer Innovation*
*A product development strategy that is based on online communities and allows some firms to benefit from a distributed process of innovation by consumers*

5. Barbara Dragsted
*SEGMENTATION IN TRANSLATION AND TRANSLATION MEMORY SYSTEMS*
*An empirical investigation of cognitive segmentation and effects of integrating a TM system into the translation process*

6. Jeanet Hardis
*Sociale partnerskaber*
*Et socialkonstruktivistisk casestudie af partnerskabsaktørers virkelighedsopfattelse mellem identitet og legitimitet*

7. Henriette Hallberg Thygesen
*System Dynamics in Action*

8. Carsten Mejer Plath
*Strategisk Økonomistyring*

9. Annemette Kjærgaard
*Knowledge Management as Internal Corporate Venturing*
*– a Field Study of the Rise and Fall of a Bottom-Up Process*

10. Knut Arne Hovdal
*De profesjonelle i endring*
Norsk ph.d., ej til salg gennem Samfundslitteratur

11. Søren Jeppesen
*Environmental Practices and Greening Strategies in Small Manufacturing Enterprises in South Africa*
*– A Critical Realist Approach*

12. Lars Frode Frederiksen
*Industriel forskningsledelse*
*– på sporet af mønstre og samarbejde i danske forskningsintensive virksomheder*

13. Martin Jes Iversen
*The Governance of GN Great Nordic*
*– in an age of strategic and structural transitions 1939-1988*

14. Lars Pynt Andersen
*The Rhetorical Strategies of Danish TV Advertising*
*A study of the first fifteen years with special emphasis on genre and irony*

15. Jakob Rasmussen
*Business Perspectives on E-learning*

16. Sof Thrane
*The Social and Economic Dynamics of Networks*
*– a Weberian Analysis of Three Formalised Horizontal Networks*

17. Lene Nielsen
*Engaging Personas and Narrative Scenarios – a study on how a user-centered approach influenced the perception of the design process in the e-business group at AstraZeneca*

18. S.J Valstad
*Organisationsidentitet*
Norsk ph.d., ej til salg gennem Samfundslitteratur

19. Thomas Lyse Hansen
*Six Essays on Pricing and Weather risk in Energy Markets*

20. Sabine Madsen
*Emerging Methods – An Interpretive Study of ISD Methods in Practice*

21. Evis Sinani
*The Impact of Foreign Direct Investment on Efficiency, Productivity Growth and Trade: An Empirical Investigation*

22. Bent Meier Sørensen
*Making Events Work Or, How to Multiply Your Crisis*

23. Pernille Schnoor
*Brand Ethos*
*Om troværdige brand- og virksomhedsidentiteter i et retorisk og diskursteoretisk perspektiv*

24. Sidsel Fabech
*Von welchem Österreich ist hier die Rede?*
*Diskursive forhandlinger og magtkampe mellem rivaliserende nationale identitetskonstruktioner i østrigske pressediskurser*

25. Klavs Odgaard Christensen
*Sprogpolitik og identitetsdannelse i flersprogede forbundsstater*
*Et komparativt studie af Schweiz og Canada*

26. Dana B. Minbaeva
*Human Resource Practices and Knowledge Transfer in Multinational Corporations*

27. Holger Højlund
*Markedets politiske fornuft*
*Et studie af velfærdens organisering i perioden 1990-2003*

28. Christine Mølgaard Frandsen
*A.s erfaring*
*Om mellemværendets praktik i en transformation af mennesket og subjektiviteten*

29. Sine Nørholm Just
*The Constitution of Meaning – A Meaningful Constitution?*
*Legitimacy, identity, and public opinion in the debate on the future of Europe*

**2005**

1. Claus J. Varnes
*Managing product innovation through rules – The role of formal and structured methods in product development*

2. Helle Hedegaard Hein
*Mellem konflikt og konsensus – Dialogudvikling på hospitalsklinikker*

3. Axel Rosenø
*Customer Value Driven Product Innovation – A Study of Market Learning in New Product Development*

4. Søren Buhl Pedersen
*Making space*
*An outline of place branding*

5. Camilla Funck Ellehave
*Differences that Matter*
*An analysis of practices of gender and organizing in contemporary workplaces*

6. Rigmor Madeleine Lond
*Styring af kommunale forvaltninger*

7. Mette Aagaard Andreassen
*Supply Chain versus Supply Chain Benchmarking as a Means to Managing Supply Chains*

8. Caroline Aggestam-Pontoppidan
*From an idea to a standard*
*The UN and the global governance of accountants' competence*

9. Norsk ph.d.

10. Vivienne Heng Ker-ni
*An Experimental Field Study on the*

*Effectiveness of Grocer Media Advertising*
*Measuring Ad Recall and Recognition, Purchase Intentions and Short-Term Sales*

11. Allan Mortensen
*Essays on the Pricing of Corporate Bonds and Credit Derivatives*

12. Remo Stefano Chiari
*Figure che fanno conoscere*
*Itinerario sull'idea del valore cognitivo e espressivo della metafora e di altri tropi da Aristotele e da Vico fino al cognitivismo contemporaneo*

13. Anders McIlquham-Schmidt
*Strategic Planning and Corporate Performance*
*An integrative research review and a meta-analysis of the strategic planning and corporate performance literature from 1956 to 2003*

14. Jens Geersbro
*The TDF – PMI Case*
*Making Sense of the Dynamics of Business Relationships and Networks*

15 Mette Andersen
*Corporate Social Responsibility in Global Supply Chains*
*Understanding the uniqueness of firm behaviour*

16. Eva Boxenbaum
*Institutional Genesis: Micro – Dynamic Foundations of Institutional Change*

17. Peter Lund-Thomsen
*Capacity Development, Environmental Justice NGOs, and Governance: The Case of South Africa*

18. Signe Jarlov
*Konstruktioner af offentlig ledelse*

19. Lars Stæhr Jensen
*Vocabulary Knowledge and Listening Comprehension in English as a Foreign Language*
*An empirical study employing data elicited from Danish EFL learners*

20. Christian Nielsen
*Essays on Business Reporting*
*Production and consumption of strategic information in the market for information*

21. Marianne Thejls Fischer
*Egos and Ethics of Management Consultants*

22. Annie Bekke Kjær
*Performance management i Proces-innovation*
*– belyst i et social-konstruktivistisk perspektiv*

23. Suzanne Dee Pedersen
*GENTAGELSENS METAMORFOSE*
*Om organisering af den kreative gøren i den kunstneriske arbejdspraksis*

24. Benedikte Dorte Rosenbrink
*Revenue Management*
*Økonomiske, konkurrencemæssige & organisatoriske konsekvenser*

25. Thomas Riise Johansen
*Written Accounts and Verbal Accounts*
*The Danish Case of Accounting and Accountability to Employees*

26. Ann Fogelgren-Pedersen
*The Mobile Internet: Pioneering Users' Adoption Decisions*

27. Birgitte Rasmussen
*Ledelse i fællesskab – de tillidsvalgtes fornyende rolle*

28. Gitte Thit Nielsen
*Remerger*
*– skabende ledelseskræfter i fusion og opkøb*

29. Carmine Gioia
*A MICROECONOMETRIC ANALYSIS OF MERGERS AND ACQUISITIONS*

30. Ole Hinz
*Den effektive forandringsleder: pilot, pædagog eller politiker?*
*Et studie i arbejdslederes meningstilskrivninger i forbindelse med vellykket gennemførelse af ledelsesinitierede forandringsprojekter*

31. Kjell-Åge Gotvassli
*Et praksisbasert perspektiv på dynamiske*
*læringsnettverk i toppidretten*
Norsk ph.d., ej til salg gennem Samfundslitteratur

32. Henriette Langstrup Nielsen
*Linking Healthcare*
*An inquiry into the changing performances of web-based technology for asthma monitoring*

33. Karin Tweddell Levinsen
*Virtuel Uddannelsespraksis*
*Master i IKT og Læring – et casestudie i hvordan proaktiv proceshåndtering kan forbedre praksis i virtuelle læringsmiljøer*

34. Anika Liversage
*Finding a Path*
*Labour Market Life Stories of Immigrant Professionals*

35. Kasper Elmquist Jørgensen
*Studier i samspillet mellem stat og erhvervsliv i Danmark under 1. verdenskrig*

36. Finn Janning
*A DIFFERENT STORY*
*Seduction, Conquest and Discovery*

37. Patricia Ann Plackett
*Strategic Management of the Radical Innovation Process*
*Leveraging Social Capital for Market Uncertainty Management*

**2006**

1. Christian Vintergaard
*Early Phases of Corporate Venturing*

2. Niels Rom-Poulsen
*Essays in Computational Finance*

3. Tina Brandt Husman
*Organisational Capabilities, Competitive Advantage & Project-Based Organisations*
*The Case of Advertising and Creative Good Production*

4. Mette Rosenkrands Johansen
*Practice at the top*
*– how top managers mobilise and use non-financial performance measures*

5. Eva Parum
Corporate governance som strategisk kommunikations- og ledelsesværktøj

6. Susan Aagaard Petersen
*Culture's Influence on Performance Management: The Case of a Danish Company in China*

7. Thomas Nicolai Pedersen
*The Discursive Constitution of Organizational Governance – Between unity and differentiation*
*The Case of the governance of environmental risks by World Bank environmental staff*

8. Cynthia Selin
*Volatile Visions: Transactons in Anticipatory Knowledge*

9. Jesper Banghøj
*Financial Accounting Information and Compensation in Danish Companies*

10. Mikkel Lucas Overby
*Strategic Alliances in Emerging High-Tech Markets: What's the Difference and does it Matter?*

11. Tine Aage
*External Information Acquisition of Industrial Districts and the Impact of Different Knowledge Creation Dimensions*

*A case study of the Fashion and Design Branch of the Industrial District of Montebelluna, NE Italy*

12. Mikkel Flyverbom
*Making the Global Information Society Governable*
*On the Governmentality of Multi-Stakeholder Networks*

13. Anette Grønning
*Personen bag*
*Tilstedeværer i e-mail som interaktionsform mellem kunde og medarbejder i dansk forsikringskontekst*

14. Jørn Helder
*One Company – One Language?*
*The NN-case*

15. Lars Bjerregaard Mikkelsen
*Differing perceptions of customer value*
*Development and application of a tool for mapping perceptions of customer value at both ends of customer-supplier dyads in industrial markets*

16. Lise Granerud
*Exploring Learning*
*Technological learning within small manufacturers in South Africa*

17. Esben Rahbek Pedersen
*Between Hopes and Realities:*
*Reflections on the Promises and Practices of Corporate Social Responsibility (CSR)*

18. Ramona Samson
*The Cultural Integration Model and European Transformation.*
*The Case of Romania*

**2007**

1. Jakob Vestergaard
*Discipline in The Global Economy*
*Panopticism and the Post-Washington Consensus*

2. Heidi Lund Hansen
*Spaces for learning and working*
*A qualitative study of change of work, management, vehicles of power and social practices in open offices*

3. Sudhanshu Rai
*Exploring the internal dynamics of software development teams during user analysis*
*A tension enabled Institutionalization Model; "Where process becomes the objective"*

4. Norsk ph.d.
Ej til salg gennem Samfundslitteratur

5. Serden Ozcan
*EXPLORING HETEROGENEITY IN ORGANIZATIONAL ACTIONS AND OUTCOMES*
*A Behavioural Perspective*

6. Kim Sundtoft Hald
*Inter-organizational Performance Measurement and Management in Action*
*– An Ethnography on the Construction of Management, Identity and Relationships*

7. Tobias Lindeberg
*Evaluative Technologies*
*Quality and the Multiplicity of Performance*

8. Merete Wedell-Wedellsborg
*Den globale soldat*
*Identitetsdannelse og identitetsledelse i multinationale militære organisationer*

9. Lars Frederiksen
*Open Innovation Business Models*
*Innovation in firm-hosted online user communities and inter-firm project ventures in the music industry*
*– A collection of essays*

10. Jonas Gabrielsen
*Retorisk toposlære – fra statisk 'sted' til persuasiv aktivitet*

11. Christian Moldt-Jørgensen
*Fra meningsløs til meningsfuld evaluering.*
*Anvendelsen af studentertilfredshedsmålinger på de korte og mellemlange videregående uddannelser set fra et psykodynamisk systemperspektiv*

12. Ping Gao
*Extending the application of actor-network theory*
*Cases of innovation in the telecommunications industry*

13. Peter Mejlby
*Frihed og fængsel, en del af den samme drøm?*
*Et phronetisk baseret casestudie af frigørelsens og kontrollens sameksistens i værdibaseret ledelse!*

14. Kristina Birch
*Statistical Modelling in Marketing*

15. Signe Poulsen
*Sense and sensibility:*
*The language of emotional appeals in insurance marketing*

16. Anders Bjerre Trolle
*Essays on derivatives pricing and dynamic asset allocation*

17. Peter Feldhütter
*Empirical Studies of Bond and Credit Markets*

18. Jens Henrik Eggert Christensen
*Default and Recovery Risk Modeling and Estimation*

19. Maria Theresa Larsen
*Academic Enterprise: A New Mission for Universities or a Contradiction in Terms?*
*Four papers on the long-term implications of increasing industry involvement and commercialization in academia*

20. Morten Wellendorf
*Postimplementering af teknologi i den offentlige forvaltning*
*Analyser af en organisations kontinuerlige arbejde med informationsteknologi*

21. Ekaterina Mhaanna
*Concept Relations for Terminological Process Analysis*

22. Stefan Ring Thorbjørnsen
*Forsvaret i forandring*
*Et studie i officerers kapabiliteter under påvirkning af omverdenens forandringspres mod øget styring og læring*

23. Christa Breum Amhøj
*Det selvskabte medlemskab om managementstaten, dens styringsteknologier og indbyggere*

24. Karoline Bromose
*Between Technological Turbulence and Operational Stability*
*– An empirical case study of corporate venturing in TDC*

25. Susanne Justesen
*Navigating the Paradoxes of Diversity in Innovation Practice*
*– A Longitudinal study of six very different innovation processes – in practice*

26. Luise Noring Henler
*Conceptualising successful supply chain partnerships*
*– Viewing supply chain partnerships from an organisational culture perspective*

27. Mark Mau
*Kampen om telefonen*
*Det danske telefonvæsen under den tyske besættelse 1940-45*

28. Jakob Halskov
*The semiautomatic expansion of existing terminological ontologies using knowledge patterns discovered*

*on the WWW – an implementation and evaluation*

29. Gergana Koleva
*European Policy Instruments Beyond Networks and Structure: The Innovative Medicines Initiative*

30. Christian Geisler Asmussen
*Global Strategy and International Diversity: A Double-Edged Sword?*

31. Christina Holm-Petersen
*Stolthed og fordom*
*Kultur- og identitetsarbejde ved skabelsen af en ny sengeafdeling gennem fusion*

32. Hans Peter Olsen
*Hybrid Governance of Standardized States*
*Causes and Contours of the Global Regulation of Government Auditing*

33. Lars Bøge Sørensen
*Risk Management in the Supply Chain*

34. Peter Aagaard
*Det unikkes dynamikker*
*De institutionelle mulighedsbetingelser bag den individuelle udforskning i professionelt og frivilligt arbejde*

35. Yun Mi Antorini
*Brand Community Innovation*
*An Intrinsic Case Study of the Adult Fans of LEGO Community*

36. Joachim Lynggaard Boll
*Labor Related Corporate Social Performance in Denmark*
*Organizational and Institutional Perspectives*

**2008**

1. Frederik Christian Vinten
*Essays on Private Equity*

2. Jesper Clement
*Visual Influence of Packaging Design on In-Store Buying Decisions*

3. Marius Brostrøm Kousgaard
*Tid til kvalitetsmåling?*
*– Studier af indrulleringsprocesser i forbindelse med introduktionen af kliniske kvalitetsdatabaser i speciallægepraksissektoren*

4. Irene Skovgaard Smith
*Management Consulting in Action*
*Value creation and ambiguity in client-consultant relations*

5. Anders Rom
*Management accounting and integrated information systems*
*How to exploit the potential for management accounting of information technology*

6. Marina Candi
*Aesthetic Design as an Element of Service Innovation in New Technology-based Firms*

7. Morten Schnack
*Teknologi og tværfaglighed*
*– en analyse af diskussionen omkring indførelse af EPJ på en hospitalsafdeling*

8. Helene Balslev Clausen
*Juntos pero no revueltos – un estudio sobre emigrantes norteamericanos en un pueblo mexicano*

9. Lise Justesen
*Kunsten at skrive revisionsrapporter.*
*En beretning om forvaltningsrevisionens beretninger*

10. Michael E. Hansen
*The politics of corporate responsibility: CSR and the governance of child labor and core labor rights in the 1990s*

11. Anne Roepstorff
*Holdning for handling – en etnologisk undersøgelse af Virksomheders Sociale Ansvar/CSR*

12. Claus Bajlum
*Essays on Credit Risk and Credit Derivatives*

13. Anders Bojesen
*The Performative Power of Competence – an Inquiry into Subjectivity and Social Technologies at Work*

14. Satu Reijonen
*Green and Fragile*
*A Study on Markets and the Natural Environment*

15. Ilduara Busta
*Corporate Governance in Banking*
*A European Study*

16. Kristian Anders Hvass
*A Boolean Analysis Predicting Industry Change: Innovation, Imitation & Business Models*
*The Winning Hybrid: A case study of isomorphism in the airline industry*

17. Trine Paludan
*De uvidende og de udviklingsparate*
*Identitet som mulighed og restriktion blandt fabriksarbejdere på det aftayloriserede fabriksgulv*

18. Kristian Jakobsen
*Foreign market entry in transition economies: Entry timing and mode choice*

19. Jakob Elming
*Syntactic reordering in statistical machine translation*

20. Lars Brømsøe Termansen
*Regional Computable General Equilibrium Models for Denmark*
*Three papers laying the foundation for regional CGE models with agglomeration characteristics*

21. Mia Reinholt
*The Motivational Foundations of Knowledge Sharing*

22. Frederikke Krogh-Meibom
*The Co-Evolution of Institutions and Technology*
*– A Neo-Institutional Understanding of Change Processes within the Business Press – the Case Study of Financial Times*

23. Peter D. Ørberg Jensen
*OFFSHORING OF ADVANCED AND HIGH-VALUE TECHNICAL SERVICES: ANTECEDENTS, PROCESS DYNAMICS AND FIRMLEVEL IMPACTS*

24. Pham Thi Song Hanh
*Functional Upgrading, Relational Capability and Export Performance of Vietnamese Wood Furniture Producers*

25. Mads Vangkilde
*Why wait?*
*An Exploration of first-mover advantages among Danish e-grocers through a resource perspective*

26. Hubert Buch-Hansen
*Rethinking the History of European Level Merger Control*
*A Critical Political Economy Perspective*

**2009**

1. Vivian Lindhardsen
*From Independent Ratings to Communal Ratings: A Study of CWA Raters' Decision-Making Behaviours*

2. Guðrið Weihe
*Public-Private Partnerships: Meaning and Practice*

3. Chris Nøkkentved
*Enabling Supply Networks with Collaborative Information Infrastructures*
*An Empirical Investigation of Business Model Innovation in Supplier Relationship Management*

4. Sara Louise Muhr
*Wound, Interrupted – On the Vulnerability of Diversity Management*

5. Christine Sestoft
*Forbrugeradfærd i et Stats- og Livsformsteoretisk perspektiv*

6. Michael Pedersen
*Tune in, Breakdown, and Reboot: On the production of the stress-fit self-managing employee*

7. Salla Lutz
*Position and Reposition in Networks – Exemplified by the Transformation of the Danish Pine Furniture Manufacturers*

8. Jens Forssbæck
*Essays on market discipline in commercial and central banking*

9. Tine Murphy
*Sense from Silence – A Basis for Organised Action*
*How do Sensemaking Processes with Minimal Sharing Relate to the Reproduction of Organised Action?*

10. Sara Malou Strandvad
*Inspirations for a new sociology of art: A sociomaterial study of development processes in the Danish film industry*

11. Nicolaas Mouton
*On the evolution of social scientific metaphors:*
*A cognitive-historical enquiry into the divergent trajectories of the idea that collective entities – states and societies, cities and corporations – are biological organisms.*

12. Lars Andreas Knutsen
*Mobile Data Services:*
*Shaping of user engagements*

13. Nikolaos Theodoros Korfiatis
*Information Exchange and Behavior*
*A Multi-method Inquiry on Online Communities*

14. Jens Albæk
*Forestillinger om kvalitet og tværfaglighed på sygehuse*
*– skabelse af forestillinger i læge- og plejegrupperne angående relevans af nye idéer om kvalitetsudvikling gennem tolkningsprocesser*

15. Maja Lotz
*The Business of Co-Creation – and the Co-Creation of Business*

16. Gitte P. Jakobsen
*Narrative Construction of Leader Identity in a Leader Development Program Context*

17. Dorte Hermansen
*"Living the brand" som en brandorienteret dialogisk praxis:*
*Om udvikling af medarbejdernes brandorienterede dømmekraft*

18. Aseem Kinra
*Supply Chain (logistics) Environmental Complexity*

19. Michael Nørager
How to manage SMEs through the transformation from non innovative to innovative?

20. Kristin Wallevik
*Corporate Governance in Family Firms*
*The Norwegian Maritime Sector*

21. Bo Hansen Hansen
*Beyond the Process*
*Enriching Software Process Improvement with Knowledge Management*

22. Annemette Skot-Hansen
*Franske adjektivisk afledte adverbier, der tager præpositionssyntagmer indledt med præpositionen à som argumenter*
*En valensgrammatisk undersøgelse*

23. Line Gry Knudsen
*Collaborative R&D Capabilities*
*In Search of Micro-Foundations*

24. Christian Scheuer
*Employers meet employees*
*Essays on sorting and globalization*

25. Rasmus Johnsen
*The Great Health of Melancholy*
*A Study of the Pathologies of Performativity*

26. Ha Thi Van Pham
*Internationalization, Competitiveness Enhancement and Export Performance of Emerging Market Firms:*
*Evidence from Vietnam*

27. Henriette Balieu
*Kontrolbegrebets betydning for kausativalternationen i spansk*
*En kognitiv-typologisk analyse*

**2010**

1. Yen Tran
*Organizing Innovationin Turbulent Fashion Market*
*Four papers on how fashion firms create and appropriate innovation value*

2. Anders Raastrup Kristensen
*Metaphysical Labour*
*Flexibility, Performance and Commitment in Work-Life Management*

3. Margrét Sigrún Sigurdardottir
*Dependently independent*
*Co-existence of institutional logics in the recorded music industry*

4. Ásta Dis Óladóttir
*Internationalization from a small domestic base:*
*An empirical analysis of Economics and Management*

5. Christine Secher
*E-deltagelse i praksis – politikernes og forvaltningens medkonstruktion og konsekvenserne heraf*

6. Marianne Stang Våland
*What we talk about when we talk about space:*
*End User Participation between Processes of Organizational and Architectural Design*

7. Rex Degnegaard
*Strategic Change Management*
*Change Management Challenges in the Danish Police Reform*

8. Ulrik Schultz Brix
*Værdi i rekruttering – den sikre beslutning*
*En pragmatisk analyse af perception og synliggørelse af værdi i rekrutterings- og udvælgelsesarbejdet*

9. Jan Ole Similä
*Kontraktsledelse*
*Relasjonen mellom virksomhetsledelse og kontraktshåndtering, belyst via fire norske virksomheter*

10. Susanne Boch Waldorff
*Emerging Organizations: In between local translation, institutional logics and discourse*

11. Brian Kane
*Performance Talk*
*Next Generation Management of Organizational Performance*

12. Lars Ohnemus
*Brand Thrust: Strategic Branding and Shareholder Value*
*An Empirical Reconciliation of two Critical Concepts*

13. Jesper Schlamovitz
*Håndtering af usikkerhed i film- og byggeprojekter*

14. Tommy Moesby-Jensen
*Det faktiske livs forbindtlighed*
*Førsokratisk informeret, ny-aristotelisk* ἦθος*-tænkning hos Martin Heidegger*

15. Christian Fich
*Two Nations Divided by Common Values*
*French National Habitus and the Rejection of American Power*

16. Peter Beyer
*Processer, sammenhængskraft og fleksibilitet*
*Et empirisk casestudie af omstillingsforløb i fire virksomheder*

17. Adam Buchhorn
*Markets of Good Intentions*
*Constructing and Organizing Biogas Markets Amid Fragility and Controversy*

18. Cecilie K. Moesby-Jensen
*Social læring og fælles praksis*
*Et mixed method studie, der belyser læringskonsekvenser af et lederkursus for et praksisfællesskab af offentlige mellemledere*

19. Heidi Boye
*Fødevarer og sundhed i senmodernismen*
*– En indsigt i hyggefænomenet og de relaterede fødevarepraksisser*

20. Kristine Munkgård Pedersen
*Flygtige forbindelser og midlertidige mobiliseringer*
*Om kulturel produktion på Roskilde Festival*

21. Oliver Jacob Weber
*Causes of Intercompany Harmony in Business Markets – An Empirical Investigation from a Dyad Perspective*

22. Susanne Ekman
*Authority and Autonomy*
*Paradoxes of Modern Knowledge Work*

23. Anette Frey Larsen
*Kvalitetsledelse på danske hospitaler*
*– Ledelsernes indflydelse på introduktion og vedligeholdelse af kvalitetsstrategier i det danske sundhedsvæsen*

24. Toyoko Sato
*Performativity and Discourse: Japanese Advertisements on the Aesthetic Education of Desire*

25. Kenneth Brinch Jensen
*Identifying the Last Planner System*
*Lean management in the construction industry*

26. Javier Busquets
*Orchestrating Network Behavior for Innovation*

27. Luke Patey
*The Power of Resistance: India's National Oil Company and International Activism in Sudan*

28. Mette Vedel
*Value Creation in Triadic Business Relationships. Interaction, Interconnection and Position*

29. Kristian Tørning
*Knowledge Management Systems in Practice – A Work Place Study*

**TITLER I ATV PH.D.-SERIEN**

**1992**

1. Niels Kornum
*Servicesamkørsel – organisation, økonomi og planlægningsmetoder*

**1995**

2. Verner Worm
*Nordiske virksomheder i Kina*
*Kulturspecifikke interaktionsrelationer ved nordiske virksomhedsetableringer i Kina*

**1999**

3. Mogens Bjerre
*Key Account Management of Complex Strategic Relationships*
*An Empirical Study of the Fast Moving Consumer Goods Industry*

**2000**

4. Lotte Darsø
*Innovation in the Making*
*Interaction Research with heterogeneous Groups of Knowledge Workers creating new Knowledge and new Leads*

**2001**

5. Peter Hobolt Jensen
*Managing Strategic Design Identities The case of the Lego Developer Network*

**2002**

6. Peter Lohmann
*The Deleuzian Other of Organizational Change – Moving Perspectives of the Human*

7. Anne Marie Jess Hansen
*To lead from a distance: The dynamic interplay between strategy and strategizing – A case study of the strategic management process*

**2003**

8. Lotte Henriksen
*Videndeling*
*– om organisatoriske og ledelsesmæssige udfordringer ved videndeling i praksis*

9. Niels Christian Nickelsen
*Arrangements of Knowing: Coordinating Procedures Tools and Bodies in Industrial Production – a case study of the collective making of new products*

**2005**

10. Carsten Ørts Hansen
*Konstruktion af ledelsesteknologier og effektivitet*

**TITLER I DBA PH.D.-SERIEN**

**2007**

1. Peter Kastrup-Misir
*Endeavoring to Understand Market Orientation – and the concomitant co-mutation of the researched, the researcher, the research itself and the truth*

**2009**

1. Torkild Leo Thellefsen
*Fundamental Signs and Significance-effects*
*A Semeiotic outline of Fundamental Signs, Significance-effects, Knowledge Profiling and their use in Knowledge Organization and Branding*

2. Daniel Ronzani
*When Bits Learn to Walk Don't Make Them Trip. Technological Innovation and the Role of Regulation by Law in Information Systems Research: the Case of Radio Frequency Identification (RFID)*

**2010**

1. Alexander Carnera
*Magten over livet og livet som magt*
*Studier i den biopolitiske ambivalens*